The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XIV. No. 357 APRIL 17, 1926 Prepaid Annual Subscription: United Kingdom, £1.1.0; Abroad, £1.6.0.

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE *is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders and Postal Orders should be made payable to Benn Brothers, Ltd.*

Editorial and General Offices – 8, *Bouverie St., London, E.C.4.*

Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (6 lines).

The I.G.'s New Move

THE announcement made in THE CHEMICAL AGE of last week concerning the intention of the I. G. Farbenindustrie Aktiengesellschaft to register as a British company, with head offices at Manchester, for the sale and distribution of their products, aroused great interest throughout the country, and was for some time an eagerly discussed topic in the Lancashire and Yorkshire textile area. The views we expressed on the situation in our last issue were reproduced in the principal daily journals of the country, and the special correspondents who were instantly set at work from *The Times* and other offices had nothing of material interest to add beyond the fact that their inquiries confirmed our original announcement.

The hasty assumption of some commentators that the I.G. move represents a direct attack on the British Dyestuffs Corporation is merely due to their habit of taking every reference to "British dyestuff interests" to apply solely to the B.D.C. No such suggestion has appeared in our own columns; in fact, if the proposed head distributing centre is established in Manchester, it seems more likely to promote than to impede a friendly understanding. But the position of the British Dyestuffs Corporation remains exactly what it was when the reconstruction scheme was first announced—no negotiations with the I.G. are in progress or in contemplation.

The only "dyestuff interests" likely to be immediately affected by the scheme are the interests of the traders or factors who have acted as agencies for German products in the past. If the distribution of German colours and chemicals in this country is for the future to be controlled by the I.G. itself and taken, therefore, out of the hands of British merchants, the latter's material interest in the repeal of the Dyestuffs Act will be appreciably reduced. At one time this business of importation and sale attained very large proportions, but, as the Board of Trade returns published in this issue show, the imports of German dyestuffs have now declined to a relatively unimportant figure. This is indicative, not only of the strict supervision of the Licensing Committee, but still more of the enormous development of home production. In this connection, it may be added that the new Board of Trade returns for March show an increase in both the imports and exports of chemicals over the corresponding month of last year—a position we have not had the satisfaction of recording for some time past.

Mass Carbonisation in Germany

THOSE who have studied in detail the recent report of the Coal Commission will recollect that particular emphasis was laid on the fact that at the present time no less than 147 million tons of coal per annum are consumed most wastefully in the raw state, while only some 37 million tons are pre-treated by carbonisation. The members of the Commission quite rightly recognised the difficulties that must face any attempt to remedy this disparity, for they expressed the opinion that for some purposes it is questionable whether it would be economical to carbonise the coal before burning it, and it has yet to be determined how best to convey the energy latent in the coal to the spot where it is needed and in the form in which it can be most effectively employed. When consideration is given to the remarkable efficiency of the modern process of carbonisation it may appear to be something of an anachronism that the use of raw coal should be tolerated at all, but in this case one is faced with the old problem of attempting to reconcile the capabilities afforded by scientific treatment with the commercial considerations it introduces in the way of the disposal of immense quantities of subsidiary products for which it might be a matter of impossibility to find new markets. There is, however, no question that in the not very distant future the principle of carbonisation is bound to be extended; and, this being the case, it is as well for those at present responsible for the process in this

country to examine their systems in the light of what is being done elsewhere, and to satisfy themselves that technically we are not being left behind by developments in America and Germany.

We have been prompted to refer to this subject by reason of the fact that a member of our staff, who has lately had occasion to make a close study of conditions in Germany, has been struck by the tendency which he observed in that country towards the utilisation of ovens of considerable capacity set vertically in lieu of the more commonplace horizontal form as employed as a standard practice in this country. No one would be prepared to deny that the horizontal oven has its particular recommendations, but on the other hand it cannot but be thought that the coking industry in this country has its lesson to learn from the gas industry, which in the last decade has registered a really remarkable advance, both from the technical and economic point of view, by adopting systems of vertical carbonisation. The point to be stressed is that while in this country we undoubtedly excel in the construction of vertical plants for coal throughput up to five tons per retort per day, in Germany (for example, the plant on the Koppers principle at Mannheim) mass carbonisation on a scale up to 10 tons per oven per day is being successfully achieved, and with, moreover, the production of a high-quality domestic coke. It would seem to go without saying that if mass carbonisation on these lines can be made a practical proposition, then there must follow an all-round reduction in both capital and operating costs, thus rendering it possible to sell the recovered products at a lower figure. As in general it is argued that systems of low-temperature carbonisation have scarcely yet been established on a commercial basis sufficiently long to enable the claims for them to be fully established, it would appear that the more extended use of ordinary coke is most likely to contribute towards the problem of reducing the use of raw coal. If, therefore, mass carbonisation in vertical ovens (which will yield a domestic as distinct from a metallurgical material) is finding a growing number of adherents in Germany it should be worth the attention of the carbonising industries over here.

Colour Research

THE various interests, which have been engaged for some time in an effort to establish a research association for the British paint, colour, and varnish manufacturing industry, may be congratulated on their early success. At a meeting of the trade in London on Wednesday it was unanimously decided to form such an association; a first council was constituted, and a committee was appointed to draft the memorandum and articles of association. The scheme is very much the same as those that various other industries have arranged jointly with the Department of Scientific and Industrial Research. The industry itself is guaranteeing for the next five years an annual grant of £2,500, which will be supplemented by an equal amount from the Department. The latter has undertaken to make a further grant of £1 for every £1 raised by the industry up to a limit of £5,000 a year. For five years, therefore, the Research Association is assured of a minimum annual income of £5,000, which the industry will be free to increase, if it so determines, up to £10,000. An impression prevails that the research work may be started in association with some provincial university, but no director has yet been chosen, and opinion seems a little uncertain as to whether he should be someone with previous chemical experience of the industry or an outside chemist chosen for his purely research qualifications. While every interest concerned has been creditably associated with this movement, none will begrudge a special word of acknowledgment to the oil and colour chemists and their president (Dr. Morgan) for their sound educational work concerning the necessity of research.

Beet Sugar Manufacture

IN our editorial note in our issue of March 28 of last year it was suggested that the manufacture of beet sugar was essentially a chemical process. Ample confirmation of this view is to be found in the paper read by Mr. J. Kwantes at the joint meeting of the Institution of Chemical Engineers and the Chemical Engineering Group on Wednesday. From the cultivation of the land and the application of suitable fertilisers to the disposal of the waste products, chemistry and chemical engineering play a vital part.

Mr. Kwantes' paper, apart from describing the process and plant in considerable detail, emphasises many considerations which are indispensable preliminaries in determining the suitability of a site for a sugar beet works. Obviously, the factory must be situated at a point where the sugar beet can be grown advantageously. An adequate supply of raw material at a minimum transport cost is essential. Equally, it is important to ensure that reasonably cheap limestone of satisfactory quality is available, as well as an abundant supply of water and a cheap supply of fuel. Mr. Kwantes observes significantly that the supply of lime may constitute a very important factor, as limestone is only obtainable in restricted areas, and freight may assume a considerable item of expenditure. The capacity of an economic unit of plant is given as from 700 to 1,500 tons per day. As the period of operation is a restricted one of about 12 to 16 weeks, 10,000 to 20,000 tons of beet must be treated annually. The consumption of power represents 1–1½ h.p. for each ton of beet treated per 24 hours, and the consumption of coal is from 7,000 to 15,000 tons per year. As regards labour, during the "campaign" 400–600 men are employed in a normal-sized factory in shifts of eight hours. The foregoing figures convey some idea of the magnitude of the operations of a sugar beet factory, and incidentally indicate the important bearing that this industry may have on the unemployed problem.

As regards technique, there appears to be scope for improvement, judging by the particulars furnished in the paper. Extraction of juice is effected by a diffusion process, involving the principles of osmosis. Fine slicing of the beet is necessary, and efficiency of extraction involves obtaining the heaviest and purest juices. Rapidity of working and the control of temperature are important considerations; the former influencing the yield, in that the juice quickly deteriorates, and the latter affecting the extent of the purification. The use

of lime serves a double purpose. It acts chemically, precipitating part of the impurities, and decomposing others, while it has a distinct mechanical function in entraining insoluble substances in the raw juice. From 1·5 to 2·5 per cent. of lime is employed on beets, according to the method of working, at the various factories. Purification of the juicé is effected by lime, which can be applied in three forms. Here is a problem which does not appear to have been fully explored: Under what conditions should quicklime, milk of lime, or sucrate of lime be used? Which is likely to ensure the best purification at the least expense? In the carbonation process, the object of which is to remove the excess lime used as carbonate, thereby aiding filtration of the juice, concentration of the CO_2 is important, in that the quicker the carbonation is effected the higher the quality of the juice and the less the steam losses.

Some of the problems that call for further investigation, in our view, are: (*a*) The best form in which the scumpress cake can be disposed of; (*b*) the defecation of the juice by phosphoric acid, phosphates, ozone, etc., as contrasted with the methods usually employed; (*c*) the economics of the use of activated carbons, which reduce the colouring and viscosity of the juice, thus minimising the different boilings and facilitating the production of white sugar; and (*d*) the relative merits of disposing of the molasses as a cattle food, or establishing distilleries, and using the material for the production of industrial alcohol. These do not exhaust the list: they merely represent current but typical problems. That the production of sugar beet is a matter of peculiar interest to chemists and chemical engineers appears certain. One can only express the hope that they will not regard it as a stereotyped process, but will seek to introduce modifications that will contribute to its permanence, even after the payment of the existing subsidy shall have ceased.

Chemical Research in Russia

RECENT numbers that have been received of *The Journal of the Russian Physico-Chemical Society* (Parts 1–5 of Vol. LVII) indicate a revival of chemical research in Russia. They contain much that is superior to what has been published since the outbreak of the revolution. This is particularly emphasised by the condition laid down by the new editorial board which consists of Faworsky as editor-in-chief, supported by Kistjakoff, Nemetkin, Tschitschibabin, and others, that original papers only should henceforth be published in the journal. The thirty-five papers, eleven of which are communicated from factory laboratories, cover 516 pages and they naturally deal with a variety of subjects. Particular reference must, however, be made to several papers by Kolosofsky on the thermochemistry and by Unikofskaya on the internal friction of solutions. These are certainly outstanding communications, which deserve special attention. Of interest also, are several papers by Nemetkin on camphor and borneol and by Tschitschibabin on the nitration of quinoline. It will be remembered that Tschitschibabin had already made a careful study of the nitration of pyridin and its derivatives and had established certain laws referring to the chemistry of pyridin which have proved of much value in the study of the alkaloids. This recent work on the nitration of quinolin goes to show the benzolic and the pyridinic properties of the two nuclei in quinoline. In conclusion reference may be made to a paper by Moldafsky which deals with the much-discussed question as to the glucosidal character of the enzymes. Moldafsky's work refers particularly to pepsin, and he has now conclusively shown that pure pepsin does not contain inosit, as assumed in some quarters.

Books Received

DYESTUFFS AND COAL-TAR PRODUCTS. By T. Beacall, F. Challenger, G. Martin, and H. J. S. Sand. London: Crosby Lockwood and Son. Pp. 168. 16s.

A TEXT-BOOK OF ORGANIC CHEMISTRY. By Dr. Julius Schmidt. English Edition by Dr. H. Gordon Rule. London: Gurney and Jackson. Pp. 798. 25s.

The Calendar

Apr. 17	North of England Institute of Mining and Mechanical Engineers: General Meeting, 2.30 p.m.	Newcastle-on-Tyne
19	Institution of the Rubber Industry: Salesmen's and Advertising Section. H. F. Trevillion and A. H. Isaac will address the meeting on the suggested scope of the proposed Section	Engineers' Club, Coventry Street, London, W.
19-24	Exhibition of British Artificial Silk Goods organised by *The Drapers' Organiser* and *Dry Goods Export Journal*. Open 10-7 daily	Holland Park Hall, Piccadilly, London
20	Society of Chemical Industry (Birmingham and Midland Section): Joint Conference with the Chemical Engineering Group. "Measuring and Weighing Instruments, as applied to the Chemical Industry." Papers by W. A. Benton and H. R. Trost. 5.30 p.m.	White Horse Hotel, Congreve Street, Birmingham
21	Society of Glass Technology: Annual General Meeting. 2.30 p.m.	The University, Sheffield
21	Society of Chemical Industry (Nottingham Section). Joint meeting with the Nottingham Society of Engineers: "Stream-line Filtration." Professor J. W. Hinchley. 7.15 p.m.	University College, Nottingham
21	Institute of Chemistry (London and South Eastern Counties Section): Visit to Government Laboratory. Tea 4.30 p.m.	London
22	Oil and Colour Chemists' Association: "The Optical Properties of Linseed Oil and the technique of Van Eyck and his followers." A. P. Laurie	8, St. Martin's Place, Trafalgar Square, London, W.C.2
23	Society of Chemical Industry (Manchester Section): "The Profession of the Chemical Engineer." Sir Arthur Duckham	16, St. Mary's Parsonage, Manchester
23	Institute of Metals (Swansea Section): Annual General Meeting. 7.15 p.m.	University College, Singleton Park, Swansea
27	Institute of Metals (North East Coast Section): Annual General Meeting. 7.30 p.m.	Armstrong College, Newcastle-on-Tyne
28	Institute of Chemistry (Belfast Section): Visit to the Belfast Municipal Gas Works	Belfast
29	Royal Institution: "The Imperfect Crystallisation of Common Things." Sir William Bragg. 5.15 p.m.	21, Albemarle Street, Piccadilly, London
May 7	Chemical Engineering Group: Annual General Meeting, 6.30 p.m.	Florence Restaurant, 56, Rupert Street, London, W.1.
19	Institute of Metals: "Single Metallic Crystals and their Properties." Professor H. C. H. Carpenter. 8 p.m.	Institution of Mechanical Engineers, Storey's Gate, London

Some Chemical Aspects of Synthetic Resins.—(I)

By G. Malcolm Dyson, Ph.D., A.I.C.

In the following article (the concluding instalment of which will appear in our next issue) the author describes the preparation and the properties of synthetic resins, which, with their kindred products, are coming increasingly into industrial use.

UNTIL recently the appearance of a resin as the end-product of an organic chemical reaction was regarded by the chemist with anything but approval. It marked a block in the experimental work and, possibly, a waste of valuable material, and it has only recently been realised that, despite their somewhat dull appearance, there are not only interesting data, but commercial possibilities to be obtained from these condensation products. To-day, each resin obtained, by accident or design, in an up-to-date chemical laboratory is considered from the point of view of its production for commercial use on a large scale. The possibility of its utilisation for purposes hitherto fulfilled only by costly natural resins is worked out as a preliminary to detailed costing of its synthesis with a view to a cheapened bulk production. Much of this work has been done in commercial laboratories, and by industrial chemists, rather than by their academic colleagues, so that the literature of the subject is disseminated throughout the patent literature of various countries, and reliable information is hard to come by. The present writer aims at giving, as far as possible, a coherent account of the present state of the synthetic resin industry from the point of view of the technical chemist, dealing with the advances of the past few years, and with their industrial applications.

Broadly speaking, the synthetic resins can be divided into the following groups, according to the nature of their chemical sources :—

1. Phenol-formaldehyde resins.
2. Furfural resins.
3. Ester gums.
4. Carbamide and thiocarbamide resins.
5. Coumarone and indene resins.
6. Sulphur, rubber and naphtho-resins.

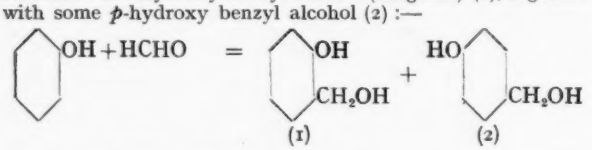
This classification, of course, is not strictly logical, and does not claim to deal with all the many known classes of resins, but since it includes and distinguishes the better known commercial resins it is chosen as a convenient basis for their description.

Phenol-formaldehyde Resins

The phenol-formaldehyde resins form the bulk of the synthetic resin which is used commercially, and, as the name implies, are obtained by the condensation of phenol and formaldehyde. For the sake of compactness and brevity the substances so produced are termed " Phenald " resins.

As early as 1872 Baeyer, in his researches on the condensation of aldehydes with hydroxy-acids, noticed that phenol and acetaldehyde gave resinous substances when condensed in the presence of a small quantity of sulphuric acid, and that pyrogallol and benzaldehyde reacted in a similar manner. These researches were carried on by Kleeberg about 1874 with formaldehyde and phenol. He found that the resinous matters obtained were in the form of very viscous fluids which on extraction with solvents left an infusible mass. The chemical analysis yielded no concordant results, and he therefore concluded that the resin was a mixture of several non-phenolic components.

The simplest condensation reaction that can take place between phenol and formaldehyde is that which results in the formation of *o*-hydroxy benzyl alcohol (saligenin) (1), together with some *p*-hydroxy benzyl alcohol (2) :—



(1) (2)

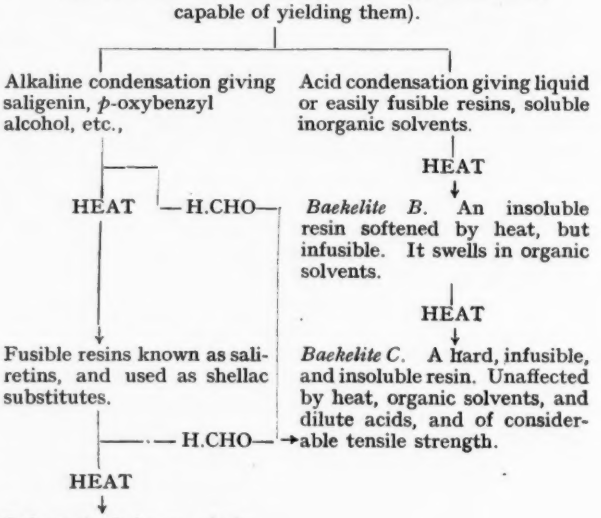
The mechanism of this reaction is uncertain and it has been suggested that the formaldehyde reacts as methylene glycol $CH_2(OH)_2$. Saligenin, the main product of the reaction, although a white crystalline solid, is unstable and readily gives rise to resinous products in the presence of basic or acidic catalysts. These saligenin condensation products go by various names, *e.g.*, saliretin, saliretone, saliretazine, etc.

The researches of Baekeland on phenald resins, culminating as they have done in the industrial utilisation of these substances in large quantities, especially as Baekelite, have reached such a state of complication as to need classification in themselves.

Baekeland himself marks the various stages in the condensation in the following ways :—

TABLE I

PHENOL and FORMALDEHYDE. (or substances capable of yielding them).



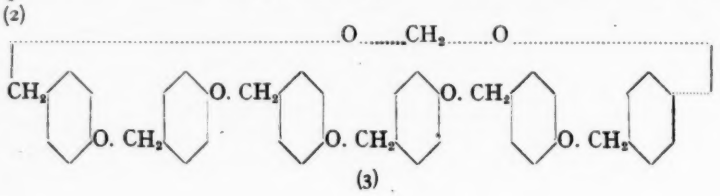
Baekelite C is probably the most important of the synthetic resins from the point of view of commerce. It is insoluble in all the usual organic solvents, including acetone, and it resists the action of boiling dilute sulphuric acid, although the concentrated acid attacks and destroys it. Electrically it is an excellent insulator, and is also a bad conductor of heat. In addition its method of formation, so easily arrested at convenient stages, makes it very suited to the manufacture of moulded articles.

The constitution of these resins is not known, although many attempts have been made to represent their nature by chemical formulæ. Baekeland has suggested for the phenald resins the formula (3), but Raschig has suggested that shown in (4).

Such attempts are sufficiently commented upon by Baekeland's own words :—

" One hypothesis is about as easy to propose as another as long as we are unable to use any of the methods for determining molecular size and molecular constitution."

The field of synthetic resin hypotheses has been, to some extent, a happy hunting ground for theorists, and many ideas



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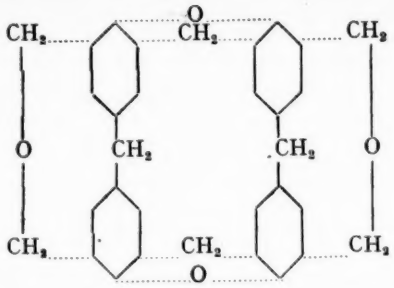
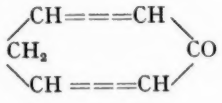


(4)

have been put forward, from such conceptions as the formation of resins through the agency of the tautomeric form of phenol (5) to the quinone formula of Herzog and Kreidl (6).

The similarity of the synthetic resins to some of the proteins is shown by their amphoteric character and points rather to the chain formula than to the "solid" formulæ more recently proposed, but at present it is preferable to leave the question of constitution until more definite data are to hand.



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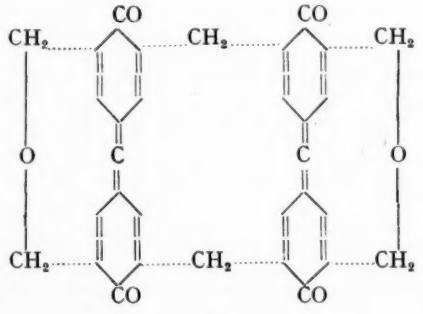


(6)

The nature of the synthetic phenald resins depends to a large extent on the choice of catalyst, and the nature of the heat treatment. There are innumerable patents dealing with catalysts for this purpose, and nearly every type of substance has been suggested at one time or another. Thus ammonia, ammonium carbonate, caustic alkalies, aniline, pyridine, urea, hexamethylene tetramine, hydrazine and hydroxylamine have been suggested as basic catalysts, whilst among the acids we may mention hydrochloric, sulphuric, lactic, phosphoric, formic, and the organic acids generally, while in addition to these, substances such as carbides, nitrides, cyanides, acetates, and other salts of alkalies with weak acids have been used to initiate different types of condensation.

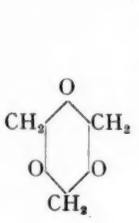
The disadvantages inherent in the use of acid catalysts lie not only in the fact that the use of resins so prepared may lead to the corrosion of metal surfaces, but also that in that they diminish the insulating qualities of the resin. Alkaline catalysts can be rendered non-injurious by incorporating an acid substance such as phthalic acid, stearic acid, colophony (containing resin acid) into the mix between the first stage resinification and hardening. Hydrazine and hydroxylamine give very clear resins, while the best resins are those in which the aminophenols are used as catalysts, having a particularly clear colour and high insulating properties.

The use of certain reagents, such as copper salts, stannic chloride, and ferric chloride give a ready means of differentiating the various classes of resins produced by different catalysts. Thus in Table II below is given the various colorations that are obtained by means of these reagents :—

TABLE II

Catalyst.	$FeCl_3$	$CuSO_4$	$CuCO_3$	$SnCl_4$	General properties.
Ammonia.	Yellow-red.	Greenish-brown.	Brown.	Red.	Insoluble and infusible, of moderate strength. Probably formed through ortho condensation.
Caustic or bisulphite.	Red-violet.	Brown.	Yellow green.	Green.	Hard and insoluble; infusible, probably from ortho condensation through saligenin.
Acids.	Nil.	Nil.	Nil.	Nil.	Soluble, fusible and often liquid products, probably formed by para condensation.

It is not necessary to use the formaldehyde as such, for it can be added in its polymeric forms paraform or trioxymethylene (7), or in the form of its condensation product with ammonia—hexamethylene-tetramine (hexamine) (8). In the case of paraform or trioxymethylene, calcium cresylate has



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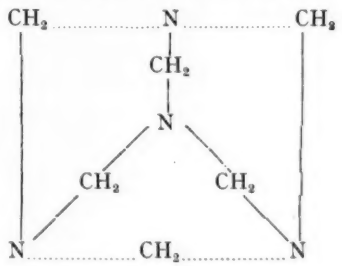


(8)

been found an excellent catalyst, while sodium sulphite gives a thin mobile liquid which is excellent for impregnating wooden or textile materials which can subsequently be hardened up. Monochlorhydrin also gives a liquid, soluble resin.

For many requirements it is desirable to arrest the process of resinification at certain stages, and it has been found that sodium hydrosulphite is a suitable reagent for this purpose. Thus, for instance, if phenol and formaldehyde in equal proportions are mixed with ½ per cent. of hydrochloric acid and gently warmed until the oily stage has been reached, the addition of ½ per cent. of sodium hydrosulphite arrests the process and on cooling a white plastic mass is obtained soluble in acetone and alcohol which has been found suitable as a substitute for shellac. The introduction of hexamine as a catalyst into synthetic resin practice has done much to facilitate the industrial side of these processes. The action of heat on hexamine is to give both ammonia and formaldehyde, so that both raw material and catalyst are added in one operation—and, moreover, without the addition of water. Thus hexamine and phenol are capable of giving a product, on heating, which does not require the removal of water—technically the most difficult part of synthetic resin practice. The proportions of phenol and hexamine are important, having a considerable influence on the nature of the product. Table III summarises the available data on this point.

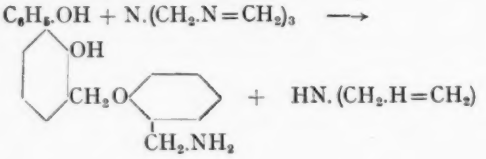
TABLE III

Phenol.	Hexamine.	Solubility in acetone.	Solubility in alcohol.	Action of heat.	General properties.
12–20	1	Sol.	Sol.	Liquid at 180° C.	Glassy and pale.
9–12	1	Insol.	Insol.	Infusible.	Orange and hard.
8–9	1	Insol.	Insol.	Rubbery at 170° C.	Resembles polymerised tung oil.
5–8	1	Insol.	Insol.	Infusible.	Hard at all temperatures.
2–5	1	Insol.	Slightly soluble.	Infusible.	Brittle, due to free hexamine.

Furthermore, the rate of heating and the temperature used have modifying influences on the end-products. Thus if six parts of hexamine and thirty-five of phenol are heated rapidly to 180° C., a brisk evolution of ammonia sets in, leaving a spongy mass which ground to a powder and moulded hot at a pressure of 5 tons per sq. in. The substances so formed has a high dielectric constant, good mechanical strength and resistance, and is unaffected by the majority of reagents. On the other hand, if the same mixture is heated at 100° C.

for twenty-four hours, only half as much ammonia is given off, and a viscous mass is obtained, which on cooling gives a clear but brittle resin.

The reaction which phenol and formaldehyde undergo, in the presence of ammonia, has been partly elucidated, and shown to take place through the agency of hexamine. The first stage of the condensation is the reaction of two molecules of phenol with one of hexamine, to give a molecule of ω-amino-o-tolyl saligenin (9) and an intermediate compound (10) which reacts with more phenol until finally degraded into ammonia. The further condensation of the ω-amino-o-tolyl saligenin (which is a crystalline compound, easily isolated) into the resin form has not been elucidated.



(9) (10)

Cresols, however, differ in their action with hexamine, and produce simple addition compounds as the first step in their resinification. Thus ortho and para cresols give hexamethylene tetramine mono- and di- ortho- and para- cresols, while meta cresol gives the corresponding hexamine tri-m-cresol, a white substance crystallising in long needles which, at 88° C., soften and are transformed into a resin. The expense of dry hexamine militates against its use as a raw material so that the usual course is to add enough hexamine to furnish the ammonia necessary as a catalyst. About 2 per cent. is a usual figure.

There are innumerable methods for the large scale condensation of formaldehyde and phenol, but they differ only in detail, and may be divided, for convenience of discussion, into two classes, the wet and dry methods. Thus in a one stage wet process the phenol and formaldehyde are mixed and gently warmed, when an oily resin layer and an aqueous layer are formed. As heating proceeds the resin becomes more viscous and the water is removed by vacuum distillation. The process is difficult to control, especially during the removal of the water, during which the whole mix is liable to turn stringy and coagulate into a rubber-like mass, extremely difficult to remove from the kettle, and of no practical value.

In the two stage wet process, the mixture is heated without a catalyst to 140° C. in a steel lined vessel capable of standing a pressure of 15–200 lb. per sq. in. The reaction commences suddenly, and is allowed to proceed at the temperature stated, with cooling if necessary to prevent overheating, until a test sample on withdrawal shows the correct softening point. The second stage then consists in the removal of the water, which is done by blowing off through an escape cock. At the temperature of the vessel (130–135° C.) the removal of water is practically complete. The finished resin is drawn off into shallow moulds, and cooled.

The wet process is used for the preparation of synthetic ambers. For this purpose five parts of phenol and three of formaldehyde are gently heated together for 80–120 hours, during which a reaction takes place with the formation of a liquid resin. Two parts of formaldehyde are now added and the mixture boiled until viscous. It is then allowed to set at 50–100° C. and hardened by keeping at that temperature for three or four weeks, or at 125° C. for several days. A little auramine is usually added to brighten up the colour, and if necessary the amber can be clouded by the addition of colloidal kaolin, or a trace of animal fat. The addition of the so-called pearl essence gives a substance which when cold and hardened, can be cut into very thin slices resembling artificial mother of pearl, as a substitute for which it is used to a considerable extent. Various other novelties can be obtained by the addition of mica dust, dyes, etc., into the still liquid resin.

The dry process for the production of these resins consists in mixing phenol with a polymerised form of formaldehyde, or using the vapours of that substance under pressure. The use of the dry process is very much favoured in manufacturing practice since it ensures the maximum latitude in the nature of the fillers, colouring matters, etc., that are used to modify the finished product. The phenol and hexamine, paraform, or trioxymethylene, are mixed in equimolecular proportions and heated until the oily resinous liquid stage is reached. At this stage appropriate dyestuffs and fillers (asbestos, clay, wood flour, bone dust, gypsum, mica dust, abrasives, etc.) are mixed in and the whole heated under pressure in appropriate moulds to the second or hard stage. At this point the resin is hard when cold, but on warming becomes elastic and can be deformed by pressure. It is insoluble in alcohol but softens and swells in acetone. The moulded articles can, however, be converted by prolonged baking into the stage III resin, the true Baekelite, which is insoluble and infusible.

All-Colour Process for Concrete

New Use for Vegetable Dyes

A NEW process has been discovered by which vegetable dyes can be used for colouring cement. The invention follows closely on the process which made it possible to obtain various hues by mixing pigment with the cement. Only a few weeks ago the London County Council announced that, using this earlier method, they proposed to brighten their suburbs by erecting concrete houses of various colours. It will now be possible to carry out any reasonable colour scheme desired by an architect. The cement will be mixed with a solution of dye which, on exposure to the air, is readily thrown down as a permanent and insoluble colouring matter upon the surface of the cement particle.

The process, it is claimed, overcomes the principal difficulty encountered in the powder method. Cement is so fine in texture that it is almost impossible to grind down any powder to a similar degree of fineness. The fragments of pigment, therefore, become dusted over with cement particles, which tend to obscure the colour and so to produce a greyish effect. By the employment of a solution of the colour, which gives the pigment in the most perfect state of subdivision, precipitation actually occurs on the cement particles themselves. It also allows the proportion of colouring matter to be reduced to a minimum; and experiments have shown that satisfactory depths of shade can be produced by the use of no more than 0·2 per cent. of colouring matter—4½ pounds to a ton.

Dr. G. N. White, who has been in charge of the experiments, states that the results have been far more successful than was originally anticipated. "We are still in the early days," he says, "but there seems no reason why concrete should not now have a range of colour equal to that of cloth. The new process should be of value to the British Portland Cement Association and other bodies which are carrying on research work in reconstructed stone. We have as yet done little in the direction of coloured concrete, but that little has already produced some beautiful effects."

Chemical Matters in Parliament

Gas Mantle Agreement

Sir P. Cunliffe-Lister (House of Commons, April 13) said that he was informed that an agreement had been made between the Gas Mantle Trade Association, representing most of the British manufacturers, and the German Gas Mantle Convention and certain associated manufacturers in other countries. The German manufacturers and the associated concerns would not sell mantles in the United Kingdom and certain other parts of the British Empire, whilst the British makers would not sell to the Continent of Europe and the United States of America. There were arrangements also in respect of other markets and the agreement was for five years.

Artificial Silk

Sir P. Cunliffe-Lister (House of Commons, April 13) said that 10 artificial silk factories had been started since July 1, of which five were in the experimental stage and five were producing; six more were expected to be started shortly.

Mr. McNeill said that the net Customs revenue collected in respect of imported silk and artificial silk goods between July 1 last and March 31, 1926, was approximately £2,591,000. The fines received up to February 28, 1926, in connection with attempts at evasion of the Silk and Artificial Silk Duties, amounted to £3,103.

Chemical Trade Returns for March

Imports and Exports Up on Last Year

IMPORTS of chemicals, dyes, drugs, and colours (excepting mercury) for March totalled £1,465,939—an increase of £82,329 on March, 1925, and an increase of £276,151 on the figures for February of this year. Exports are valued at £2,305,829, an increase of £113,557 on March of last year and an increase of £351,554 on the results of the previous month—February of this year.

On the import side there is a remarkable drop in nitrate of soda, from 331,847 cwt. to 78,393 cwt. With our exclusive announcement last week of the activities of the German dye trust in Manchester, we pointed out that the Dyestuffs (Import Regulation) Act would continue to limit the importation of products for any prospective sales centre. It is interesting to note, therefore, how small are the imports of dyes—only 111 cwt. of intermediates, 107 cwt. alizarine and equally insignificant quantities of allied products, for the whole of the month of March.

As regards exports, the sulphate of ammonia market shows some improvement with seasonal demand. Japan, after consistent decreases, rises from 1,900 to 6,444 tons. France, as last month, has taken no sulphate, and the market there would appear to be practically lost. There is a particularly marked drop in barytes, from 7,197 to 640 cwt., at an unexpected season.

Imports

	Quantities. 1925.	Quantities. 1926.	Value. 1925. £	Value. 1926. £
CHEMICAL MANUFACTURES AND PRODUCTS—				
Acid Acetic .....tons	558	749	25,835	31,101
Acid Tartaric .....cwt.	6,368	3,935	30,799	18,880
Bleaching Materials ,,	9,992	11,826	10,633	7,811
Borax ..... ,,	6,299	7,941	7,447	9,248
Calcium Carbide .. ,,	63,908	58,270	43,067	36,595
Coal Tar Products, not elsewhere specified value	—	—	40,191	48,915
Glycerine Crude ...cwt.	527	—	1,413	—
Glycerine Distilled ,,	97	183	414	734
Red Lead and Orange Lead .....cwt.	1,547	4,202	3,371	8,241
Nickel Oxide ..... ,,	4,025	2,502	21,419	14,105
Potassium Nitrate ,,	4,931	18,717	5,719	19,780
Other Potassium Compounds .....cwt.	526,566	624,607	89,909	135,426
Sodium Nitrate ... ,,	331,847	78,393	210,294	48,637
Other Sodium Compounds .....cwt.	24,370	33,932	21,061	24,479
Tartar, Cream of .. ,,	3,862	4,946	15,228	17,836
Zinc Oxide ..... tons	712	1,237	24,627	45,328
All other sorts ....value	—	—	287,815	304,943
DYES AND DYESTUFFS—				
Intermediate Coal Tar Products .....cwt.	140	111	1,540	1,781
Alizarine ..... ,,	920	107	4,337	3,181
Indigo, Synthetic ,,	—	—	—	—
Indigo, Natural.... ,,	38	67	835	1,562
Other Sorts ..... ,,	2,048	3,028	45,793	75,092
Cutch ..... ,,	5,672	7,252	9,325	12,986
Other dying extracts ,,	3,170	3,357	8,832	11,353
Extracts for Tanning cwt.	117,899	101,790	114,210	91,806
PAINTERS' COLOURS AND MATERIALS—				
Barytes, ground ...cwt.	72,434	67,488	18,664	16,148
White Lead (dry) . ,,	17,520	15,237	34,754	30,151
All other sorts..... ,,	71,222	101,964	112,825	141,466
Mercury .....lb.	30,525	109,269	5,338	21,050
Total of Chemicals, Drugs, Dyes, and Colours .....value	—	—	1,388,948	1,486,989
Artificial silk yarn ....lb.	758,378	177,005	222,969	43,037
Artificial silk manufactures (excepting apparel and embroidery) .....value	—	—	313,104	404,939

Exports

	Quantities. 1925.	Quantities. 1926.	Value. 1925. £	Value. 1926. £
CHEMICAL MANUFACTURES AND PRODUCTS—				
Acid Sulphuric ....cwt.	2,876	11,257	3,595	5,674
Acid Tartaric ..... ,,	990	1,332	5,358	7,563
Ammonium Chloride tons	269	286	7,380	8,790
Ammonium Sulphate—				
To France .....tons	731	—	10,190	2
Spain and Canaries tons	7,274	4,548	95,609	56,029
Italy ..... ,,	207	636	2,778	7,967
Dutch East Indies tons	3,955	4,584	52,534	59,202
To Japan ..... tons	1,900	6,444	23,750	82,543
British West Indies Islands ....tons	455	677	6,238	9,424
Other Countries ,,	4,676	6,516	61,920	80,808
Total..... ,,	19,198	23,405	253,019	295,975
Bleaching Powder ..cwt.	46,688	28,656	22,397	13,921
COAL TAR PRODUCTS—				
Anthracene .....cwt.	1,032	1,140	511	441
Benzol and Toluol galls.	53,041	20,734	5,240	1,860
Carbolic Acid ....cwt.	7,298	10,707	10,880	17,343
Naphtha .....galls.	3,463	7,562	315	642
Naphthalene .....cwt.	1,455	1,427	1,090	922
Tar Oil, Creosote Oil, etc. .....galls	3,063,280	5,132,566	94,777	162,453
Other Sorts .....cwt.	65,908	31,285	33,928	22,914
Total.....value	—	—	146,741	206,575
Copper, Sulphate ....tons	8,910	10,282	206,280	216,861
DISINFECTANTS, INSECTICIDES, ETC.....cwt.	34,177	38,853	81,397	96,318
Glycerine Crude .....cwt.	9,560	4,182	25,966	12,012
Glycerine Distilled ... ,,	12,639	13,758	48,187	47,866
Total..... ,,	22,199	17,940	74,153	59,878
Potassium Chromate and Bichromate .... cwt.	1,862	2,524	3,989	4,604
Potassium Nitrate.... ,,	1,176	1,062	2,579	2,148
Other Potassium compounds ....cwt.	4,958	5,223	15,142	14,715
Total..... ,,	7,996	8,809	21,710	21,467
Sodium Carbonate ..cwt.	520,678	468,062	132,627	135,968
Sodium Caustic ....cwt.	153,039	193,994	119,494	141,072
Sodium Chromate and Bichromate .....cwt.	2,286	2,953	3,720	3,994
Sodium Sulphate..... ,,	27,455	31,521	5,585	4,940
Other Sodium Salts... ,,	42,715	50,997	64,248	58,777
Total.....cwt.	746,173	747,527	325,674	344,751
Zinc Oxide.....tons	220	261	9,440	10,415
All other sorts .....value	—	—	330,966	303,342
Total (other than Drugs and Dyestuffs) value	—	—	1,488,110	1,591,530
DYES AND DYESTUFFS—				
Products of Coal Tar cwt.	10,191	10,831	90,304	72,129
Other Sorts ..... ,,	4,603	5,672	5,994	7,799
Total..... ,,	14,794	16,503	96,298	79,928
PAINTERS' COLOURS AND MATERIALS—				
Barytes, Ground...cwt.	7,197	640	3,099	334
White Lead (dry) . ,,	8,532	6,493	20,892	14,430
Paints and Colours, in Oil or Water.....cwt.	50,449	47,906	112,044	108,842
Paints and Enamels Prepared .....cwt.	32,846	30,370	114,762	100,800
All other sorts ..... ,,	49,100	58,492	99,560	116,263
Total .....cwt.	148,124	143,901	350,351	340,669
Total of Chemicals, Dyes and Colours value	—	—	2,192,272	2,305,829
Artificial silk yarn ....lb.	598,365	465,342	202,011	143,130
Artificial silk manufactures (excepting apparel and embroidery) .... value	—	—	216,713	426,899

Chemical Engineering of Beet Sugar Manufacture

Methods of Extraction and Purification

In view of the efforts which are being made to establish the beet sugar industry in this country, all contributions to our knowledge of the subject are highly valuable. Below we publish an abstract of a paper on "Beet Sugar Manufacture," read by Mr. J. Kwantes before a joint meeting of the Institution of Chemical Engineers and the Chemical Engineering Group of the Society of Chemical Industry on Wednesday.

SUGAR beet manufacture is at present a seasonable one, and thus the factory is only working with beets during a certain part of the year, and generally in the time that the beets are ripe, between October and January. The sugar beet (*Beta vulgaris*) yields about 10 tons per acre (in many cases 12 or more) with a sugar content ranging from 12 per cent. to 21 per cent. (average 15 per cent. to 17 per cent.). Before the farmer sends the beets into the factory he "tops" them, which means that the leaves and crown are squarely cut off below the lowest bud, leaving only the root to be delivered. Though the sugar in the beet is in a free but dissolved state, the process of obtaining it in its crystalline form is a fairly complicated one.

The manufacture can be divided into five main stages:

(1) The washing of the beet.
(2) The extraction, in order to separate the sugar juice.
(3) Epuration, that is, the purification of the juice.
(4) Evaporation.
(5) Crystallisation and centrifuging.

Washing

The beet is a root crop and therefore more or less soil will adhere to it. A preliminary washing takes place on transporting the beets from the storage place on the factory site into the factory itself by means of water. The actual washing, which is merely a mechanical operation, takes place in a specially constructed apparatus called a washing mill. After washing the beets are elevated to the top part of the building, where they are weighed, then falling into small silos placed above a cutting mill.

The process mainly used in extracting the juice is that known as diffusion, which method is based, apparently, on the principles of osmosis, as well as diffusion. The beet slices are systematically brought into contact with hot juice or water. The sugar juice in the broken cells of the fresh slices will pass immediately into the surrounding juice or water, but from the unbroken cells the sugar is unable to pass, and therefore these must be "killed," and this is done by means of the hot juice. Care must be taken that the slices do not remain at this high temperature for too long. The common apparatus used in the extraction process is called a diffuser, a series (generally eight to fourteen) of which are connected together. Each vessel, having a capacity of from 50 to 100 hectolitres (corresponding with a charge of 2,700 to 5,500 kg. fresh slices), has a charge opening at the top and discharge at the bottom, provided with covers, and a false perforated bottom, in order to strain the water or juice before passing from one vessel into another.

It is heated by injecting steam or by using calorifiers (small tube reheaters). When the sugar juice has passed the vessel which was last filled with fresh slices, a measured quantity is drawn off into special tanks called "measuring tanks." In certain diffusers both slices and water or juice move in opposite directions, thus giving a continuous process. The main points in diffusion are the obtaining of the heaviest and purest juices; rapid working, as the juice very quickly deteriorates; and the smallest sugar losses in the exhausted slices and in the diffusion waste waters, if any; which conditions at present cannot all be fulfilled at the same time. Whilst the juice present in 100 kg. of beet represents a volume of 88 litres, it is not possible to obtain by the diffusion methods at present employed less than from 100 to 115 litres in the extraction. The extracted juice contains about 15 per cent. by weight of sugar, and the total solids are between 17 per cent. and 17½ per cent., so that the purity of the juice—that is, sugar in 100 parts solid—lies between 85 and 89 per cent. The sugar losses—that is, the sugar not obtained in the extracted juice—amount to 0·2 to 0·5 per cent.

The spent slices or pulp contain on leaving the diffusion process about 5 per cent. of dry matter, and are pressed, and if necessary dried, before being sold to the farmer. From the process of pressing so-called "presswater" is obtained, which contains part of the sugar in the pulp, and this is further disregarded or sent back into the diffusion process.

Purifying the Juice

The highest temperature needed for the above extraction depends largely on the consistency of the beet, but 70° to 80° C. will be, in most cases, satisfactory. The whole process occupies from 1 to 1½ hours. The juice originally in the beet is practically colourless, but after leaving the diffusion it is of a reddish brown to black, caused by the working of an enzyme. It contains several impurities, of which albuminoids, pectins and organic acids are the most important. Many of these impurities must be eliminated before the juice can be used for the production of sugar crystals, the process being called epuration. The juice leaving the extraction department has a temperature generally running between 30° and 85° C., according to which special diffusion process has been adopted. In the former the juices are generally heated to about 80° C. before being purified. As a general rule lime is used for epuration, though it is only able partly to eliminate the impurities. It may be added to the juice in three forms—as quicklime, as milk of lime, or as sucrate of lime. The lime is made in the factory itself, from the burning of limestone and coke. The limestone and coke must be of a high purity.

The amount of lime now used is much in excess of the amount involved in chemical and mechanical action. The chemical action, which is complicated, consists in precipitating part of the impurities as well as decomposing others, whilst its mechanical action consists in the lime precipitate entraining with it the insoluble substances in the juice. The time that the lime is in contact with the juice is generally from 10 to 20 minutes, when quicklime is being used. The excessive amount of lime is added in order to obtain juices which are more readily handled. If only such an amount is being used as is necessary for precipitating the impurities, it is a very difficult matter to filter the juice. It has been found, however, that by adding an excessive amount, and precipitating this excess with carbon dioxide gas, that is, the gas obtained from the lime kiln, the filtering of the juice becomes, practically speaking, very easy. This part of the process is known as carbonatation. The amount of lime is usually from 1·5 to 2·5 per cent. on the beet. The amount necessary to obtain a clear juice is between 0·5 and 0·75 per cent. on the beet.

First Carbonatation

The carbonatation is never done in one step, but generally in two or three. It is absolutely essential that the first part of this should not be extended below a certain alkalinity. The treating of the juice with carbon dioxide in the first part of the carbonatation is only extended so far as to enable an easy filtration. With normal beets this limit is generally reached when the alkalinity of the juice is 0·1 g. per 100 c.c. expressed in CaO. The main points in carbonatation are the obtaining of an easy filtering juice, at the same time rendering the precipitate easily washable. An important factor is the amount of carbon dioxide gas used. Though there is always an abundance of this gas, it must not be forgotten that the quicker the carbonatation is finished the higher the quality of the juices, and the lower the steam losses. The construction of the gas distributors is therefore of great importance. The amount of CO_2 in the gas from the lime kilns should be kept as high as possible. Usually the gas contains from 30 to 32 per cent. CO_2.

After finishing the first carbonatation the juice is filtered off in presses, called "scum presses," of which many types are in use. The juices are filtered through cloths, which consist mainly of linen, cotton or jute closely woven. The juice which runs from the presses is of a light yellow colour and has, as

already mentioned, 0·1 per cent. alkalinity. The precipitate remaining in the scum presses, which is known as " scum press cake," contains about 6 to 8 per cent. sugar, and must therefore be washed out with water, the amount of water varying with the amount of sugar which the manufacturer wishes to have removed. This wash water dilutes the juice so that more water must be evaporated. From the presses the juice is pumped to the second carbonatation after first being heated up nearly to boiling-point.

Carbonatation and Sulphitation

The second carbonatation, which in some cases may be subdivided, thus adding a third, is pursued until the free lime alkali is changed into carbonate. As in practice there is not a sufficiently definite point to ascertain when this limit is reached, it is highly probable that bicarbonate of lime has been formed during the process, but this can be removed by further boiling. The juice leaving the second carbonatation is filtered through filter presses which are similar to those used in the first. After leaving these filters, it is generally boiled up and again filtered. The juice must now be evaporated, but in many cases this is preceded by a sulphitation with sulphur dioxide gas. This is done to a certain extent to decolorise the juice, but one of its main features is its power of diminishing the viscosity of the sugar solution. The sulphitation is usually taken so far that the juices are nearly neutral. Through the purification process, the purity of the juices rises by from 3 to 5 per cent., so that in these juices from 92 to 93 per cent. of sugar on total solids is present.

Most of the water is then evaporated, and the juice, after epuration and containing roughly 15 per cent. of sugar, now leaves the evaporation stage with about 55 to 60 per cent., so that about 75 per cent. of the water has been disposed of, thereby obtaining a saturated sugar solution. The evaporation is continuous, in multiple effect evaporators, and part of the steam evolved from these is used in the other processes. The evaporators should, of course, be so constructed that it is impossible to lose sugar—*e.g.*, by mechanical loss of juice drops with the steam—and generally specially constructed saveralls are necessary. In the vapour from the boiling juices, ammonia gas is present. The amount of ammonia per 1,000 tons of beet is about two to four cwt. At present all this NH_3 goes to waste. Time and high temperatures have a detrimental effect on sugar solutions, even when slightly alkaline. The essential point is that the evaporation should be conducted as quickly as possible. The juice remains in the apparatus, in the ordinary evaporation, about half an hour. The juice, when drawn off from the last pan, contains, as mentioned, about 55 to 60 per cent. sugar, and is of a light brown colour. Some impurities which are present in the thin juice become insoluble in concentrated sugar solution, and it therefore usually becomes necessary to filter this. In many cases the juice is further treated with sulphur dioxide gas.

Crystallising and Centrifuging

The process of crystallising and centrifuging is commenced in vacuum pans, which work intermittently. When the pan is filled with the mixture of sugar crystals and liquor, the contents are run into crystallisers, which are cylindrical vessels containing stirrers. The mixture, which is called a massecuite, contains about 8 to 10 per cent. water, and in this mass, when left standing, the sugar would settle—and this is one of the reasons why the crystallisers contain stirrers. The work of the crystalliser is two-fold, crystallising and cooling. The massecuite is now ready for centrifuging, the mother liquor, more than half of which is sugar, being returned again to the vacuum pans, and giving, after centrifuging, a sugar of lower purity. This process can be continued until a mother liquor is obtained in which four parts of sugar are present with one of ash, from which it is not possible to extract more sugar by simple crystallisation.

The various grades of sugar (varying colours) so obtained may or may not be further worked into the process, all depending upon what class of sugar the factory wishes to turn out. If only white sugar is being manufactured, the above described processes are repeated, once or twice, by re-dissolving these raw sugars in water or thin juice, to a saturated solution, after which most of the water is evaporated in the vacuum pan. In many cases these sugar solutions are treated with active carbons, which facilitate the production of white sugar. The decolorising carbons are coming more and more into use. When the white sugar is obtained in the centrifugals, it is, after being washed or steamed in them to remove the last traces of mother liquor, conveyed to granulators. Here it is dried by means of hot air, screened and cooled, after which it is filled into bags.

Molasses

As already mentioned, a mother liquor, known as "molasses," is left, from which it is impossible to extract more sugar by mere crystallisation, and from 2 to 2½ per cent. in the beet cannot be extracted in this way. There are, however, various processes for a further extraction, of which the osmosis and precipitating processes are well known.

In the latter, the sugar is precipitated by means of lime, or barium or strontium oxide; the precipitate, mixed with juice or water, is afterwards brought again into solution by means of CO_2 gas. Molasses contains about 10 per cent. ash, which, if it could be cheaply obtained from the waste waters of the different desugaration processes, would deliver valuable salts. Molasses is also used as a cattle food, or is used in distilleries for obtaining alcohol. Its sugar content is roughly 45 to 50 per cent. The exhausted slices from which the sugar has been extracted contain about 95 per cent. of water, the rest consisting of cellulose, albuminoids, ash, extractive and fatty substances, and from ·1 to ·3 per cent. of sugar. In some factories a certain amount only of the water is pressed out of these slices and the pulp obtained is sold directly to the farmer as cattle food. In other factories the pulp is dried in specially constructed apparatus after being pressed.

The amount of water used in the various processes varies with the manufacturing process adopted, but the greater amount is used in the conveying and washing of the beet, which water generally first passes the condensers, and six to eight tons for every ton of beet is necessary. The different beet sugar factories vary greatly in size, but a daily capacity of from 700 to 1,500 tons of beets is usual. During the " campaign," which lasts from three to four months, the factories are working day and night. A fair amount of mechanical power is required for the various processes, and for every ton of beet worked in twenty-four hours from 1 to 1½ h.p. may be required. The coal consumption, during the campaign, varies with the amount of beets received and the methods of working, but from 7,000 to 15,000 tons may be required. With regard to the labour, during the " campaign " from 400 to 600 men, working in three shifts, are employed in the factory, whilst in the slack season from 40 to 100 men may be engaged on the overhauling and repairing of the machinery, etc. The technical and chemical control are of great importance. In the laboratory a great many analyses have to be made day and night, as many parts of the process can only be controlled by chemical analysis, as, for instance, the sugar content of the fresh and exhausted slices.

There are many parts of the process capable of improvement either as to method or results or both, but it is hoped that enough has been said to demonstrate the great interest of the extraction and the value it may be to Great Britain.

" Are Capitalists Overpaid? "

THIS is the subject of what promises to be an exceptionally keen and interesting debate, which takes place between Sir Ernest Benn (chairman of Benn Brothers, Ltd.) and Mr. James Maxton, M.P., the new chairman of the Independent Labour Party, at the London School of Economics on May 11. A previous debate on " Communism " between Sir Ernest and Mr. Newbold, the former Communist Member for Motherwell, was broadcast, and attracted great interest. Sir Ernest's recent work, *The Confessions of a Capitalist*, which has passed already through seven editions in England, America, and Australia, and been accepted by five Continental publishers, gives some idea of the lively case which he may be expected to put forward on behalf of capitalism, while his opponent is recognised as one of the intellectuals of the Socialist movement, and a dexterous and capable debater. The debate is one of a series of " Lectures and Counter Lectures " organised in aid of King Edward's Hospital Fund, and the speakers and chairmen include Mr. Lloyd George, Mr. G. K. Chesterton, Lord Riddell, Mr. J. H. Thomas, M.P., Miss Sheila Kaye-Smith, Miss Irene Vanbrugh, Sir William Beveridge, Mr. St. John Ervine, Mr. Nigel Playfair.

The British Optical Convention, 1926

Remarkable Progress of British Glass Industry

The outstanding feature of this week's Optical Convention at South Kensington is the brilliant progress of the British glass industry, not only in the optical field but in the general, scientific, photographic, and medical fields. British goods can now be compared advantageously with the best foreign productions—a tribute to research and industry alike.

THE Optical Convention, 1926, under the presidency of the Astronomer-Royal, Sir Frank Dyson, was opened by the Prime Minister at Imperial College, South Kensington, on Monday and continued until to-day (Saturday).

The Prime Minister opened the Convention in the presence of a large company gathered in the Chemistry Theatre under the chairmanship of Sir Frank Dyson. Among those present were Sir Frank Paget, Sir Robert Hadfield, and Mr. F. Twyman (chairman of the Executive Committee).

The Chairman said that he thought we could say now that our optical manufacturers could not only make the staple articles as well as anybody else, but when they came to those scientific instruments which required a great deal of skill, but which offered very little pecuniary recompense to the optician, they could rely on them to produce what they required. As long as that went on, scientific research and the optical industry in this country would flourish.

The Premier in his opening speech referred to the general ignorance of the public's debt to science. They were all apt to take too much for granted. Without the microscope mankind would never be able to carry on the ceaseless war against bacillus, and without the microscope his friend, Sir Robert Hadfield, who was present, would find it difficult to make some of the steel for which Sheffield was famous. "Probably," said Mr. Baldwin, "the hedonist little realised that without the microscope, polarimeter, and refractometer he would get no beer fit to 'drink,' and kinemas would be useless without lenses."

Since the war, in spite of the great progress that had been made, the optical industry had had to struggle against the prolonged trade depression, the enormous bulk of the stocks which had been collected in the country, and the appalling competition as the result of depreciated exchanges on the Continent. In spite of all that the exhibition would show the progress that had been made. He rejoiced to be assured that, as was always the case with the best British work, many of the articles we manufactured now were recognised the world over as achieving the high water-mark of technical perfection.

Presidential Address

Sir Frank Dyson, in his presidential address in the evening, said that great advances had been made by the British optical trade in many directions. Though they could not assert that Britain held the pre-eminent position it had in the early days of the science, the optical industry might look back with pride on its achievements and progress during the last 12 years. In 1912 Germany was supplying 60 per cent. of the optical glass in use in this country; and France 30 per cent., as against 10 per cent. by Great Britain. In 1918 the demand in this country for optical glass for all purposes, which included many new types of lenses and optical instruments requiring glasses of special optical properties, was met by supplies of which 95 per cent. were of home production, the remaining 5 per cent. being imported from France. In that year the total amount of optical glass made in Great Britain was at the rate of 20,000 lb. (nearly 9 tons) per month. Since that time with the absence of the extraordinary war demands, production had been much less, but they were obtaining from British sources all the optical glass needed both in variety of type and excellence of quality.

The Exhibits

It is perhaps not altogether the fault of the organisers that the exhibits had to be so awkwardly distributed so as to occasion continual reference to maps and guide in order to locate specific stands. This rather tiring arrangement, however, was not conducive to comfort or efficient examination, and if a more compact group of rooms had been secured they would have improved the exhibition.

Optical glass was much in evidence in all stages of manufacture. Chance Brothers and Co., Ltd., Birmingham, exhibited it in its rough state and manufactured as spectacle glasses. They also showed contrast filters, lenses, prisms, and heat-resisting illuminating ware. Parsons Optical Glass Co. showed plate forms and lens mouldings. Microscopes, lenses of all types, photometers, polarimeters, etc, were shown by such well-known firms as Charles Baker, Ross, Ltd., and W. Watson and Sons, Ltd.

The British Research Association for the Woollen and Worsted Industries demonstrated colour effects and colour fading. The effects of bacteria, sunlight, moisture, etc., were shown on actual samples.

On the stand of the Thermal Syndicate, Ltd., Wallsend-on-Tyne, particular interest was paid to the K.B.B. quartz mercury vapour lamp for microscopy, which offers monochromatic illumination of absolute steadiness, great intensity, and perfect light control. The fused quartz burner tube is not exhausted but works under atmospheric pressure, thus eliminating any defects associated with vacuum type mercury lamps. Another new product displayed was the fused quartz bulb lamp for filtering the ultra-violet rays from an ordinary metal filament. Normally, the ultra-violet rays are not received through an ordinary metal filament lamp. The firm also exhibited Vitreosil in laboratory applications.

The Foster Instrument Co., Letchworth, showed optical pyrometers and radiation pyrometers with varying forms of recorders and indicators. Stafford Allen and Sons, Ltd., featured mountant (replacing Canada balsam), oils and natural cement. Lovibond's Tintometer and colour-scale were displayed by The Tintometer, Ltd., Salisbury, together with a petroleum tintometer. In an extremely wide range of exhibits, photomicrographic apparatus, selenium photometers, gas recorders, thermometers, mercury diffusion pumps, laboratory ware, and all types of lamps and lights were prominent on various stands.

In the experimental and research section the N.P.L. demonstrated spherometers, interferometry, etc., and others included Mr. C. Norman Kemp and Mr. J. Leslie Thomson showing X-ray examination of metals. Dr. R. A. Houston showed colour vision.

Papers and Discussions

There were daily readers of papers in both the Chemistry and Physical Chemistry Theatres covering such subjects as colour technology, spectrometer problems, photometry and optical subjects. Discussions followed.

An entertainment section of optical illusions attracted the lay public.

Colour Problems in the Worsted Industry

AT the Convention on Wednesday a paper was given on "Colour Problems in the Woollen and Worsted Industries," by Dr. S. G. Barker and Mr. H. R. Hirst, of the British Research Association for the Woollen and Worsted Industries, Leeds.

The lecturers made a concise survey of the causes of fading in dyed fabrics and pointed out the need of standard tests for fastness. The first requisite for such tests was a standard source of illumination, which must be reproducible and constant over long periods, and it should produce changes in dyed materials the same as sunlight would effect; it was pointed out that no satisfactory substitute for sunlight really existed.

The fading power of the ultra violet was a subject for wide research, for while one end of the spectrum acted chemically as an oxidising agent, the other end acted as a reducing agent. Methylene blue could be faded by oxidising action alone. Experiments conducted at the Association's laboratories showed that artificial sources of light gave results not in accordance with sunlight tests either as regards quantity of fading or relative fastness. The violet carbon arc gave the best results, and in the subsequent discussion on the paper various suggestions were put forward in order to remedy the fundamental defects of these sources of light.

Different methods of colour matching were compared, and it was shown that the Guild colorimeter gave good results in this direction.

Some Personal Impressions

(By a Chemical Visitor.)

The passage of years makes us no older where exhibitions are concerned—especially exhibitions of apparatus. All true chemists take a delight in a chemical substance; but this delight has its limits. What can one do with a bottle of XYZ? When comment has been made on its beautiful appearance, and its name has been pronounced in jewels five words long, there is nothing more to be said. But scientific apparatus is a horse of a very different colour, and the intense pleasure of our childhood's days is still aroused by a powerful electric spark or a spectral line. At the Optical Convention our youth was renewed. We looked down tubes and pressed switches; gloated over colours and thoroughly enjoyed ourselves. Our intense attachment to duty prevented us from devoting to the entertainments section of the convention as much attention as it deserved. But among the many astonishing phenomena which were to be seen one case of dematerialisation occurred which appears to have escaped all other eyes than our own. During a visit to the buffet we noticed a bun and a bottle of beer. We then returned to our labours, and later observed, in passing, that the bun was still present, but the bottle of beer had gone. As no reference to this matter is made in the programme and guide it is impossible to elucidate it further, but it seems worthy of investigation.

If this is written in a strain somewhat less sombre than that usually reserved for exhibitions it is not because the Optical Convention is to be regarded flippantly, but because of the keen pleasure which is induced by the spectacle of whole mountains of beautiful craftsmanship. The exhibition is calculated to gratify both the scientific and æsthetic feelings, for its contents are at once works of science and of art. In the optical industry the phrase "British workmanship" bespeaks a tradition of excellence two hundred years old, a tradition reflected in the display of old instruments and kindred things shown in the historical section of the Convention. When these old instruments were made our atmosphere was undefiled by smoke; England was a green and pleasant land; there was no unemployment; and German competition had not been invented. In those days the craftsman was able to linger lovingly over each instrument, treating its manufacture as the creation of a work of art. In some fields of industry this pleasant aspect has been rudely shattered by the onset of modern conditions. But the optical industry has survived the shock, and though the machine has largely superseded the hand of man, and the standard of accuracy is far beyond that required in other industries, the tradition of excellence built up long ago still remains, and the British product is still honoured in the world's markets.

In this industry at any rate Britain can face foreign competition with confidence. A few years ago there was a well-grounded fear that our long supremacy would be wrested from us by Germany. But during and since the war advances have been made which have restored confidence in British productions. There are no difficulties in regard to what one may describe as "intermediates," for optical glass of high quality is being manufactured in this country, and research is constantly being carried on with a view to improving it. A pleasing feature of conversations with exhibitors was the frequent reference to the satisfactory state of our export trade. Japan seems to be a large buyer of English optical apparatus, which also finds a market in the Colonies and elsewhere.

Light and Colour

It is difficult to single out any particular apparatus for special comment. Microscopes, polarimeters, refracto-meters, etc., are set out in bewildering array. Perhaps special reference may be made to certain exhibits bearing on light and colour. The display of daylight lamps, at a price which should bring them within everybody's reach, is a timely reminder that their use is not yet general enough. In laboratories where coloured solutions are used, in industries where coloured fabrics are made, and in places where coloured articles are sold, these lamps should find wider application than is at present the case. There is also an excellent display bearing on the relation of light to dyed fabrics, showing the change in colours with change from natural to artificial light, and the effect of light on dyestuffs. There is an interesting display of the comparative fading of dyed fabrics under sunlight and various forms of artificial light, which should give the public an opportunity of forming an opinion on the use of artificial light in such tests. Another kindred exhibit is that of colorimeters and tintometers. There is a large demand abroad for this particular class of product, and in Japan they are widely used by manufacturers of shawls, textiles, etc., for standardisation purposes. If the dyestuffs industry and related industries are to use their opportunities to the fullest extent it is essential that optical methods, which are clearly of the first importance, should be used to the greatest advantage.

While there are no sensational new developments to report, it is clear that manufacturers of optical products are steadily consolidating their position. An encouraging sign is the fact that apparatus regarded until recently as of merely academic interest is now coming into industrial use. One firm publishes a special pamphlet on the application of the spectrograph in metallurgy. The display of certain apparatus for pure research work indicates that research is being prosecuted in this country in directions which had formerly only been treated abroad, which is a tribute alike to our research workers and manufacturers. It cannot be too widely known that manufacturers are quite prepared to make apparatus for any special purpose, while in some cases, where the models exhibited are necessarily somewhat expensive, firms are prepared to make cheaper ones to suit the financial convenience of their customers at the special request of the latter.

The Convention should have great educational value, alike to the industrialist and the pure scientist. Every laboratory worker, sooner or later, suffers the shock of finding that some routine examination, which he carries out regularly at great expense of time, can be carried out quickly and conveniently by the use of some apparatus of the existence of which he is ignorant. The administration of shocks of this kind is the most salutary effect of such exhibitions as the one at present under notice.

Tyneside Chemical Industries

A Survey of Developments

Mr. A. Trobridge, of 6, Dene House, Ellison Place, Newcastle, writes to a Newcastle paper, in the course of which he says that the recent remarks of the Lord Mayor to the effect that the great combines in industry had led to an increase of unemployment on the Tyne are hardly justified by the facts. As to the chemical trade, the primary cause of the closing down of the numerous small works on the Tyne was not the formation of the United Alkali Co., but the other way about. The successful development of the ammonia soda process about 1880 foreshadowed the ultimate end of the old Leblanc process, which for a hundred years had been the sole process for the manufacture of soda. This process entailed a large consumption of coal and of imported pyrites or sulphur, and thus became mainly established on the two great coalfields adjacent to the Tyne and Mersey. The common salt largely used in the process was needed in a comparatively dry crystalline state, and it was more economical to bring the salt to the coal than the much larger quantity of coal to the salt.

On the other hand, says Mr. Trobridge, the ammonia soda process uses little coal, but needs salt brine, which is pumped direct from the salt beds; and for this reason Brunner, Mond and Co. established their huge industry on the Cheshire salt fields. It was the realisation of these facts which led to the formation of the United Alkali Company. The Leblanc soda makers realised their hopeless position and sold their works to the public. The opportune development of the Chance sulphur recovery process, coupled with the high technical skill and organisation which the new company brought to bear on the industry, kept the old process alive until recent years.

The old glass works on the Tyne, I believe, were almost entirely engaged in the manufacture of glass bottles by hand. Now we have the huge works of Messrs. Pilkington at St. Helens, and Chance Brothers and Co. at Spon Lane. The latter firm also have a large optical glass works, where they produce most of the lighthouse lenses for the world. On the Tyne and Wear we still have several important works. There is Sowerby's Ellison glass works at Gateshead and the Wear Flint Glass works at Sunderland, as well as the Lemington Glass works.

A Colour Research Association

For the Paint, Varnish and Allied Trades

THE final steps were taken to form the Research Association of British Paint, Colour and Varnish Manufacturers at a largely attended meeting of the trade held at the offices of the London Chamber of Commerce on Wednesday.

Mr. S. K. THORNLEY, who presided, explained that the Department of Scientific and Industrial Research have agreed to provide, on the £ for £ basis, a sum up to £5,000 per annum for a period of five years, and already the industry has guaranteed a sum of £2,500 per annum for five years, which is the minimum under the scheme. Whether further subscriptions come in or not the scheme was definitely going forward, as the necessary funds had been guaranteed for the first period of five years. The basis of subscription proposed was the number of employees engaged by a particular firm. For instance, firms employing under 25 employees would pay 10 guineas per annum; over 25 and under 50 employees, 12 guineas; from 50 to 100 employees, 20 guineas; from 100 to 200 employees, 40 guineas; and over 200 employees, 60 guineas. There were to be three grades of membership—namely, ordinary members, consisting of firms actually manufacturing paint, colour, varnish and allied products; associate members, who would consist of firms manufacturing machinery and accessories, and of scientific workers; and honorary members. The suggestion at the moment was that as the original members of the Association would pay their subscriptions from the beginning, firms coming in later should also pay their subscription from the commencement of the Association. This was to prevent them from obtaining an unfair advantage. It was proposed to carry on the Association in a similar manner to the existing research associations in other industries—namely, under the direction of a council, supervising a paid director and a paid staff. There would be a president, vice-president, and 18 members of the council, with 3 members nominated by the Department of Scientific and Industrial Research. No steps had yet been taken to appoint a director of research; there appeared to be some difference of opinion as to whether the director should be a skilled chemist with experience in the paint, varnish, and allied industries, or someone outside the industry. This matter was left to the final decision of the council.

The First Council

After this general outline by Mr. Thornley some points were raised in discussion. For instance, the view was expressed that it would be better to have a flat rate subscription instead of a differential one based on the number of employees, and there was also some difference of opinion as to the desirability of giving one firm one vote or arranging the voting power in proportion to the number of employees, or the amount of the subscription. These and other matters of course were referred to the Council.

A resolution definitely forming the Association was passed and the following were elected as the first Council of the Association until the first general meeting, which will be held when the Board of Trade has finally sanctioned the articles of association:—Mr. A. G. Cryer, Mr. C. F. A. Hare, Mr. J. Russell Thornbery, Mr. S. K. Thornley, Mr. Ellwood Holmes, Major J. G. G. Mellor, Dr. H. H. Morgan, Mr. M. Harrison, Colonel G. A. Wilson, Mr. P. P. Rankin, S. E. George, and Mr. A. Selby Wood. It is hoped to arrange for the research work, at any rate as a start, to be carried out at one of the universities, probably in the provinces. A drafting committee, consisting of Mr. S. K. Thornley, Mr. A. G. Cryer and Dr. H. H. Morgan, which has already done a considerable amount of work, is now completing the form of Memorandum and Articles of Association for submission to the Board of Trade.

German Exhibition Abandoned

THE Chemical Apparatus Group of the Verein deutscher Chemiker announces that owing to the present economic depression it has been decided to abandon the exhibition of chemical apparatus, Achema V, which was to have been held in Kiel this year. An exhibition will be held in Essen in 1927. *The Achema Yearbook* for 1926, giving a report of the state and development of chemical apparatus, will appear as usual.

English Snia Viscosa Factory

Further Developments in Artificial Yarns

FROM time to time activities have been reported concerning the proposed site for the English factory of Snia Viscosa, Ltd., which has been definitely arranged for, according to Signor Gualino, who presided at the annual meeting of the Snia concern in Turin (see THE CHEMICAL AGE, February 27, 1926). The company wants a site of 35 to 40 acres on which to erect a factory able to produce daily 110,000 lb. of artificial wool; 500 to 600 tons of chemicals and coal per day would be required, and 5,000 kilowatts of electric power continuously for 24 hours, also 11,000,000 galls. of water daily. Birkenhead is negotiating for the factory and is understood to be able to meet all the requirements except the water supply, and it is thought that possibly there is some misunderstanding on this point. Prominent Birkenhead officials, including the mayor, are in London, and a 40-acre site bordering on the West Float and Wallasey golf links is under consideration. Employment would be found for several thousand men if the scheme materialises.

The Austrian artificial silk industry, of which the chief producer is the St. Poeltner Glanzstoffabriks Co. with an annual output of 1,500 tons by the Viscose process, is protesting against dumping and demands a protective duty. The works mentioned have reduced staffs by 50 per cent. owing to foreign competition.

The Sarvar Rayon Manufacturing Co., Hungary's oldest artificial silk factory, has dismissed several hundred workers, and the former daily production of approximately 3,600 lb. has been reduced to one-third. The Sarvar Co. is a subsidiary of the Belgian Tubize Co., and was established to produce Chardonnet silk. The chief cause in the present depression is said to be the competition of the Snia Viscosa Co., and home competition has also started in the establishment of the Magyarovar Rayon Co.

Government Trading Results

Phosphate Commission Profits

THE accounts of the trading or commercial services conducted by Government Departments during the period ended March 31, 1925, were published on Friday, April 9, together with the report of the Comptroller and Auditor-General.

The profits for the two years ended June 30, 1924, of the British Phosphate Commission were £94,523, of which the British share was £39,700 (42 per cent.). The account for the year ended June 30, 1925, which it was understood showed a divisible profit of approximately £100,000 had not reached the Comptroller and Auditor-General.

The accounts of the British Industries Fair cover two years, owing to the postponement of the Fair in 1924 to coincide with the British Empire Exhibition. The changes of date had involved additional expenditure, notably in the increase of rent from £12,000 to £15,000. The account shows a loss of £11,632, making a total loss of £12,565 0s. 11d. on the whole series of Fairs to March 31, 1925.

Final liquidation of accounts still delayed pending legal decisions, arbitration, settlements with foreign Governments, etc., and large debtor and creditor balances remain uncleared, included sugar, petroleum, and potash.

Reparation Dyestuffs

Deliveries of reparation dyestuffs from German manufacturers during the year were valued at invoice cost at £630,947. Sales during the year realised £342,585. The stock on hand at the end of the year was valued at £398,187, and the loss carried to balance sheet was £54,641, due to writing down stocks in hand.

Scottish LL.D. for Dr. Armstrong

THE Senators of St. Andrews University have resolved to confer, at the graduation ceremony on June 29, the honorary degree of LL.D. on Dr. Edward Frankland Armstrong, Ph.D., D.Sc., F.R.S., managing director of the British Dyestuffs Corporation, in recognition of his distinguished services to chemical science and industry.

Society of Public Analysts

Papers on Various Analyses

AN ordinary meeting of the Society was held at the Chemical Society's Rooms, Burlington House, on Wednesday, April 7, 1926, Mr. E. Richards Bolton, president, being in the chair.

Certificates were read for the first time in favour of Messrs. A. Barraclough, B.Sc., A.I.C., G. G. Elkington, K. M. Griffin, M.Sc., A.I.C., H. Firth, A.I.C., and T. Pickerill, B.Sc., and for the second time in favour of Messrs. J. Allan, M. T. Casey, B.Sc., M.Sc., G. H. Davis, J. Grant, M.Sc., A.I.C., and Miss M. M. Ruston, B.Sc., F.I.C.

The following were elected members: Messrs. S. Back, B.Sc., A.I.C., H. H. Bagnall, B.Sc., F.I.C., W. P. Crocker, B. W. A. Crutchlow, B.Sc., A.I.C., A. M. Ferguson, M.A., B.Sc., A.I.C., R. H. Klein, A.I.C., O. J. Napier, M.A., A.I.C., G. Stubbs, C.B.E., F.I.C., J. H. Williams, B.Sc., F.I.C., K. A. Williams, B.Sc., A.I.C.

Acetic Acid and Anhydride

Mr. H. Droop Richmond and Mr. A. J. Eggleston read a paper on "The Analysis of Acetic Anhydride." By adding 2 c.c. of acetic anhydride to 200 c.c. of a mixture of 94 parts of toluene and 6 parts of aniline and measuring the rise of temperature produced in their action, a determination of the strength of the acetic anhydride could be made with an accuracy comparable to that of the method of Menschutkin and Wasilieff. It was necessary in very accurate work to make a correction for the heat evolved in the formation of aniline acetate, but a very close approximation could be obtained by multiplying the observed rise of temperature by a factor.

"The Analysis of Glacial Acetic Acid" was discussed in a paper by Mr. Richmond and Mr. E. H. England. They presented a table showing the specific gravities and freezing points of glacial acetic acid for each 0·1 per cent. from 90 to 100. Acetic acid was almost unique in that specific gravity fell with increasing percentage, whilst the freezing point rose. Impurities, of which propionic acid was the most important, lowered both specific gravity and freezing point. By calculating the specific gravity from the table equivalent to the freezing point and subtracting from it the specific gravity found, a close approximation to the percentage of propionic acid could be obtained by dividing by 0·00135. Other impurities were aldehydes and ketones, probably chiefly propionaldehyde and homologues.

In a paper on "Errors of Judgment in Chemical Analysis," Dr. J. F. Tocher stated that the recent work of Professor K. Pearson and Mr. E. S. Pearson had shown that the mean values of personal judgment in physical experiments were of an irregular periodic character with respect to time. In the author's experiments on the titration of sodium hydroxide solution with *N*-sulphuric acid, it was found that the mean results of successive determinations during a forenoon were also of a periodic character. On an average the first two determinations were less reliable than the others. The means of succeeding pairs of duplicate determinations also varied in an irregular and periodic manner round the general mean. The variations in the personal equations of observers were independent of the apparatus and the material.

Composition of Milk

Dr. Tocher's second paper, "Variations in the Composition of Milk," was a continuation of his study of the total quantity of the constituents of milk given, on an average, by an individual cow at each milking and of the relationship of the casein to other factors. The percentage of butter fat tended to decrease slightly with increasing yield per milking, but the total amount of butter fat (and also of solids not fat) increased proportionally with increased yield. The bearing of these facts on the problem of the selection of cows was discussed.

Messrs. E. R. Bolton and K. A. Williams, in their paper on "A Test for Tung Oil," suggested that previous attempts to obtain a definite and constant petroleum spirit extract of unpolymerised matter from the residue of Worstall's test had failed owing to incomplete and uncontrolled polymerisation. When the test was carried out under the conditions set forth a definite yield of extract varying between narrow limits was obtained, and, consequently, adulterants were readily disclosed by the yield of extract in excess of the standard amount. Most of the oils likely to be used as adulterants were completely recovered in the extract; linseed oil being an exception, in which case approximately 50 per cent. was retained in the polymerised mass.

The S.C.I. at Manchester

More Papers by Members Suggested

THE annual general meeting of the Manchester section of the Society of Chemical Industry was held on Friday, April 9. Mr. L. Guy Radcliffe presided. The following members were elected to fill six committee vacancies:—Dr. A. Coulthard, Dr. J. C. Withers, Messrs. N. Simpkin, John Allan, J. T. Allpass, and J. Huebner.

The annual report of the Honorary Secretary (Mr. A. McCulloch), after detailing the papers read during the session, stated that the reading of short papers by members was a practice that the chairman and committee would like to see extended. They also desired to receive suggestions from individual members with a view to making the section more useful to the general body. The membership was practically the same as that of a year ago. An appeal was also made for a more general support of the hospitality fund.

Dr. F. M. Rowe and Mr. H. C. Clanahan were reappointed as auditors.

At the conclusion of the proceedings of the annual meeting the monthly meeting of the section was held.

Chemical Constitution of Coal

A paper entitled "The Constitution of Coal" was read by Dr. R. V. Wheeler, Professor of Fuel Technology in the University of Sheffield. Dr. Wheeler said that he had come to the conclusion that the constitution of coal was not so complicated as had been formerly believed. As the result of recent research work in Sheffield there was now greater hope of being able to explain the chemical compounds of coal, and the manner in which they affected its quality, owing to the recognition of the presence of ulmic compounds, to which attention was first directed by Thompson in 1807. These compounds were characterised by their solubility in alkaline solutions, to which they imparted a deep brown colour. It had been found that by mild oxidation of bituminous coal—*e.g.*, by atmospheric air at a temperature of approximately 200° C., it was possible to transform the whole of some coals into substances which were completely soluble in caustic potash. The ulmins, or the products of bacterial alteration of cellulose and compound celluloses, were thus regenerated, showing that the whole of that coal was composed of ulmic material.

Bituminous Coal Ingredients

The four ingredients of bituminous coal—Vitrain, Durain, Clarain, and Fusain—differed very markedly not only in their microscopical appearance, but in their chemical properties. The particular ingredient of coal which could be rendered completely soluble by regulated oxidation was Vitrain, and the conclusion to be drawn from that fact was that it was essentially ulmic in character. It was, in fact, the bacterial product of the ligneous tissue of plants. Clarain could be rendered almost soluble, leaving an insoluble residue composed of the cuticular parts of leaves and stems and spore exines, which apparently remained unchanged in the coal and could be examined separately. Durain was also partly soluble in caustic potash, and also deposited plant entities resistant to solubility. In the case of British coals, the amount of insoluble plant entities in clarain and durain was approximately 10 to 15 per cent., the remainder of the composition being ulmic in character. If it was recognised that the vitrain portion of the coal was essentially ulmic in character, then 90 per cent. of the clarain constituent was also ulmic, and durain 70 per cent. This conclusion was based upon purely chemical grounds. The deduction was drawn that ordinary bituminous coal consisted of a material containing certain plant entities which had not been acted upon by bacteria and had not altered in form.

The research work at the Sheffield University had been to investigate the chemical properties of the coal material, and to ascertain the different plant entities which could be separated from it.

From Week to Week

SIR ALFRED MOND will address the second British Advertising Conference to be held at Blackpool during the first week in May.

ITALIAN REPORTS state that the German dye trust is preparing to increase its sales in Italy, especially in the textile industry, which is expanding.

MR. LANCASTER, buying essential oils, is due in this country and may be reached care of Marshall, Field and Co., Regent Street, London, W.1.

THE FIRST ANNUAL DINNER of the Oil Society was held in London on Friday, March 9. The growing knowledge of oil was stressed, and it was stated that an Imperial oil industry was rapidly being built up.

THE ORDINARY SCIENTIFIC MEETING of the Chemical Society, arranged for Thursday, has been postponed to April 22 at 8 p.m., when a paper on "An analysis of the ether (II): The magnetic fields in atoms" will be read by W. C. Reynolds.

ITALY'S SYNTHETIC AMMONIA CAPACITY is estimated at 25,000 tons per annum, according to the report of the Montecatini, the great chemical concern which itself is responsible for 18,000 tons. Plants under construction are expected to produce another 15,000 tons.

MR. WILLIAM MAW, B.Sc., senior physics master at Rutherford College Boys' School, Newcastle, has been appointed headmaster of the school. He is also lecturer in organic chemistry, etc., at the evening technical school. The position carries a salary of £800, rising to £1,000.

TENANTS AND HOUSES adjacent to the Government poison gas experimental ground at St. Helens have been served with warrants ordering vacation by this week. They had previously been ordered to vacate by the county court judge, but no other accommodation is at present available.

THE LAW COURTS reopened on Monday and actions down for this session include the resumed hearing of Courtaulds' petition for the revocation of the Rousset artificial silk patents, before Mr. Justice Eve, and in the King's Bench Division there are three libel actions by the British Oxygen Co. against Liquid Air, Ltd.

AN EXHIBITION, to be known as "The International Oil, Chemical and Colour Trades Exhibition," will be held at the Royal Agricultural Hall, London, from June 11 to 18, 1927, arranged by the International Trade Exhibitions, Ltd., Broad Street House, Old Broad Street, London, E.C.2, whence information can be obtained.

A SPECIAL ARTIFICIAL SILK NUMBER of the *Manchester Guardian Commercial* is published this week. It contains detailed surveys of progress in all the leading producing countries, and articles include "The Future of Cellulose Research," by C. F. Cross; "Dyestuffs and the Dye-bath," by Dr. F. M. Rowe; "Washing Problems," by Th. H. Bernsen; and "By-Products," by J. Foltzer.

AN AGREEMENT has been made officially between British and continental gas mantle interests whereby it is anticipated that the bulk of the business formerly done by Continental interests in the U.K. will now be secured by British manufacturers. It will be recalled that British makers quite recently secured a protective duty of 6s. per gross on mantles for at least five years.

MR. C. C. H. BRAZIER, A.M.I.Chem.E., has been appointed by the Associated Portland Cement Manufacturers, Ltd., to be the first manager of the reconstructed Bevans Works at Northfleet, which, when completed, will be the largest cement factory in Europe. Mr. Brazier is a London man who was from 1921 to 1925 in charge of the A.P.C.M. undertaking in South Africa, and since his return to England has been temporarily manager of the company's works at Penarth.

THE FOLLOWING STATEMENT was issued by Lever Brothers, Ltd., on Thursday, April 8: "Under the articles of association of the company co-partnership dividends are payable in any year only out of surplus profits remaining after payment of all preference dividends and a dividend at the rate of 5 per cent. on the issued ordinary capital. As no dividend on the ordinary share capital for the year 1925 is recommended by the directors, it follows as of course that no co-partnership dividend is payable or will be paid in respect of that year."

THE SWEDISH MATCH CO., the Svenska Tändsticks Aktiebolaget, presented its annual report on Wednesday, and showed satisfactory progress. All Swedish factories are now working full time. During the past year, the activities of the company's factories abroad have developed to a remarkable degree, due not only to the extension of the plants already owned by the company, but also to the establishment of new plants and the acquisition of a number of new match concerns, including the following transactions, complete in co-operation with the Company's American subsidiary, the International Match Corporation, viz., the agreements entered into with the Republics of Poland and Peru by which the company acquired the match monopolies in these countries. The company's factories in India have during 1925 been able to increase their manufacturing capacity fourfold. The company's activities in Japan and China showed satisfactory development.

THE APPOINTMENT of Mr. W. E. Morton to the Chair in Textile Technology, Manchester (reported in THE CHEMICAL AGE last week), has been confirmed.

THE ADVERTISING AGENCY of Charles Tayler and Co., Ltd. (founded in 1874), has now been incorporated with the agency of Roy Hardy, Ltd., 292, High Holborn, London, W.C.1.

MR. GEORGE DOUGLAS, chairman and managing director of the Bradford Dyers' Association, Ltd., who was taken ill with influenza recently whilst on business in New York, is reported to be making excellent progress towards recovery.

THE CELLULOSE HOLDINGS AND INVESTMENT CO. have decided to withdraw their recent offer to sell their British Celanese shares by tender, and the former company will now appoint their representatives to the board of the British Celanese Co.

A VISIT TO THE GOVERNMENT LABORATORY, Clements Inn Passage, Strand, will be made by members of the London section of the Institute of Chemistry on Wednesday next, April 21, at 4.30. The secretary should be advised of those wishing to be present.

TERTIARY BUTANOL, the latest product from petroleum, is now being offered commercially at moderate prices in New York. Its organic structure is stated to offer many opportunities for synthesis of new materials, and its solvent action is noticeably different from any of the other available alcohols.

A GENERAL MEETING of the members of the Royal Institution was held on Monday, Sir James Crichton-Browne, treasurer and vice-president, in the chair. Mr. H. S. Broome, Mrs. Lionel Bulteel, Mrs. Charlesworth, Dr. Ellen M. Delf, Mrs. G. K. Moore-Brown and Dr. S. B. Schryver were elected members.

OUR ENTERPRISING CONTEMPORARY, *Drug and Chemical Markets*, New York, will be divided as from the first issue in May. *Drug Markets* will be published on alternate Tuesdays and *Chemical Markets* will be published on the Thursday of each week. It is hoped by this means to cover each division more comprehensively.

DR. RENÉ CLAVEL, director of British Celanese, Ltd., Canadian Celanese, Ltd., and a member of the Swiss dye firm of Clavel and Lindenmeyer, has recently been making arrangements for the American production of several new fabrics embodying "Celanese," the product of the American Cellulose and Chemical Manufacturing Co.

"MODERN SUNLIGHT" is the title of a new independent journal dealing with the development of natural and artificial sunlight. It treats especially with the medical and scientific aspects of the subject, and points to the rapidly increasing use of ultra-violet radiation. The journal is published monthly at Oswaldestre House, Norfolk Street, Strand, W.C.2.

THE CONSUMPTION of margarine in this country in 1913 was 7·76 lb. per head, while in 1924 it was 11·77 lb., said Sir Charles J. Stewart, presiding at the annual meeting of Jurgens, Ltd., on Tuesday in London. The consumption was known to be greater during 1925 and margarine was gaining in favour, and his opinion was that margarine was no longer merely supplementary to butter but had established a position of its own in the national dietary. Their operations in respect of raw materials had again proved successful, despite market vicissitudes. Price cutting had been diminished and a minimum retail price had been fixed at 8d. per lb., resulting in the stabilisation of the cheapest grade on an economic basis of price and quality. Sales showed record increases.

THE LONDON SUGAR REFINERS, in a statement on the beet sugar subsidy, state that the subsidy reacts on the vast industry of sugar-refining, which produces 50 per cent. of the total consumption of sugar. The refiners not only have beet-sugar manufacturers working against them, but they have themselves to contribute as taxpayers to the subsidy. They find their trade dislocated because sugar-beet factories have to throw on the market as soon as possible their entire output so as to regulate finances. Foreign importers are able to "dump" and undersell both the output of the established refineries and the sugar-beet factories. The British refineries are faced, therefore, with assisted competition on all hands. They cannot export. Sugar production in other lands is protected. They therefore have to face the reduction both of their work and of their workmen. Their position could be improved by limiting the sugar-beet factories to the production of raw sugar only. Two voluntarily observe this limitation, but the others do not.

Obituary

DR. LOUIS ANTHYME HERDT, Professor of Electrical Engineering at McGill, was found shot on Sunday. He conducted much technical research, and was president of the Canadian National Committee of the International Electro-Technical Commission.

MR. JAMES FAIRRIE, head of the well-known sugar firm of Fairrie and Co., at Harrogate, on Wednesday, April 7, aged 65. Under his management refining processes have been gradually developed and perfected, and business has been enormously increased in volume. At the time of his death he was president of the British Sugar Refiners' Association, chairman of the Lancashire Sugar Refiners' Association, and chairman of the Sugar Association of Lancashire. He resided in Southport.

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The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each

Abstracts of Complete Specifications

248,802. Dyes and Dyeing. J. I. M. Jones, 39, Westbourne Road; B. Wylam, Carr House, Regent Street, Lancaster; J. Morton, Longlands, Lancaster; and Morton Sundour Fabrics, Ltd., Carlisle. Application dates, July 25, 1924, and May 25, 1925.

Derivatives of leuco vat dyestuffs are produced by treating them with phosphoric oxychloride or alkyl phosphoric halides in the presence of a suitable basic body such as light pyridine. In an example dry leuco flavanthrone is suspended in carbon disulphide and light pyridine. Phosphoric oxychloride is added gradually at ordinary temperature and the temperature is then raised to 70° C. The mixture is shaken with water and filtered, yielding a dark blue product which is readily soluble in dilute caustic soda solution giving a violet solution. Material dyed with this solution may be reconverted to the shade given by flavanthrone when immersed in an acid solution of ferric chloride.

248,811. Soluble Vat Dyestuffs Preparations, Manufacture of. W. Carpmael, London. From Farbenfabriken vorm. F. Bayer and Co., Leverkusen, near Cologne, Germany. Application date, November 8, 1924.

The object is to obtain vat dyestuff preparations which are soluble in cold or slightly warm water. These products are obtained by mixing an unvatted dyestuff with a caustic alkali, a sulphonic acid salt having a dispersing action, or a soluble carbohydrate, and with hydrosulphite, and evaporating to dryness. These sulphonic acid salts may be the sulphonic acids of unsaturated fatty acids, salts of lignin sulphonic acids, sulphite cellulose, etc., and the carbohydrate may be glucose or dextrine. The process is preferably carried out so that no sulphonic acid salt or soluble carbohydrate remains in the mixture. The mixture of dyestuff and sulphonic acid salt or soluble carbohydrate and free alkali is evaporated or dried, and the alkali and sulphonic acid salt or soluble carbohydrate then washed out and the necessary quantity of alkali is again added. Examples are given of products obtained from 2-(4^1-chloranilido)-1 : 4-naphthoquinone, dianilido-quinone, di-(*p*-chloranilido)-benzoquinone, and the vat dye obtained from 5 : 7-dichloroisatin and 6-chloroindoxyl.

248,858. Anthraquinone Dyestuffs Possessing Affinity for Acetyl Silk, Manufacture of. British Dyestuffs Corporation, Ltd., 70, Spring Gardens, Manchester, W. H. Perkin, South Parks Road, Oxford, and C. Hollins, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, December 16, 1924.

It has been found that α-α-ureas and diureas can be obtained by heating α-anthraquinonyl urethane or α-anthraquinonyl urea chloride and α-amino-anthraquinone derivatives, preferably those containing two amino groups in α-positions, *e.g.*, 1 : 4-, 1 : 5-, or 1 : 8-diamino-anthraquinone or diamino-anthrarufin or diamino-chrysazin. The products obtained from one molecular proportion of diamino-anthrarufin or diamino-chrysazin and one or two molecular proportions of α-anthraquinonyl-urethane are particularly suitable for the production of brown or blue-grey shades on acetyl silk. Examples are given.

248,828. Distilling Fatty Acids and Other Volatile Substances from Oils and Fats, Acid Oils, and Crude Fatty Acids, Process for. J. J. V. Armstrong, Liverpool. From Naamlooze Vennootschap Ant. Jurgens' Margarinefabrieken, Oss, Holland. Application date, December 10, 1924.

This process is for removing fatty acids, etc., from mixtures containing neutral oils, to obtain neutral undecomposed oils and fats and pure fatty acids. In the usual processes for distilling fatty acids, the residue is heated for too long a time, so that it is partly decomposed and the fatty acids obtained are not pure. In the steam distillation at high temperature of crude oils and fats, the residual neutral oil is of a quality inferior to that of the original crude oil. In the present invention, these disadvantages are avoided by employing a very short duration of the heating of the liquid phase, a large contact surface between the liquid and steam or gas, a reduced pressure, and a temperature of liquid phase not exceeding 250° C. The short heating is effected by supplying the fresh material continuously, and removing the residue continuously and immediately cooling it. The large contact surface is obtained by the use of a filling material or by finely dividing the liquid. The heating is effected by superheated steam, gases, or liquids, or by electric heating elements, but not by open fire heating.

248,864. Recovery of Soda from Its Solution, Apparatus for. W. M. Wallace, Randolph Hill, Denny, Stirlingshire. Application date, December 18, 1924. Addition to 217,468.

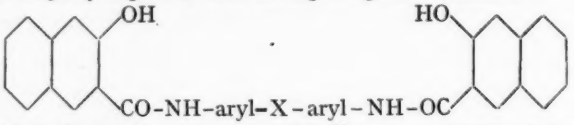
Specification No. 217,468 (see The Chemical Age, Vol. XI, p. 70) describes the recovery of spent liquor produced in the manufacture of paper by calcining the concentrated solution in a rotary furnace, discharging the product on to a travelling grate, and passing air upwards through the grate so that further burning takes place as the material is being transported. In this invention the furnace is provided with a hollow perforated roof through which air is also supplied to the upper surface of the material to effect a quicker and more complete burning.

248,866. Amino Dianthrimides, Process for the Preparation of. British Dyestuffs Corporation, Ltd., 70, Spring Gardens, Manchester, H. M. Bunbury, Crumpsall Vale Chemical Works, and R. Robinson, The University, Manchester. Application date, December 19, 1924.

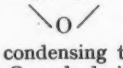
It has been found that the anthraquinone mono oxamic acids of the type $NH_2.AQ.NH.CO.COOH$ (where AQ is a divalent anthraquinone residue) are useful intermediates in the preparation of mono-, di-, etc., amino-anthrimides. The mono-oxamic acids are obtained from the diamino-anthraquinones and oxalic acid, and may be condensed with halogenated anthraquinones to obtain the dianthrimides. During the condensation the oxalyl group may be partly converted into the formyl group. Hydrolysis of the resulting dianthrimide removes the oxalyl or formyl group and other acyl groups yielding the corresponding amino-dianthrimide. Examples are given of the preparation of 4 : 5^1-diamino-1 : 1^1-dianthrimide and 5 : 5^1-diamino-1 : 1^1-dianthrimide.

248,946. New Azo-Dyestuffs and Intermediate Products, Manufacture of. A. G. Bloxam, London. From Chemische Fabrik Griesheim-Elektron, Frankfurt-on-Main, Germany. Application date, April 15, 1925.

The process is for obtaining new derivatives of the arylides of 2 : 3-oxy-naphthoic acid having the general formula



where X is an azo group—N=N—or an azoxy group



which are obtained by condensing the chloride of 2 : 3-oxy-naphthoic acid or an O-acyl derivative thereof with an aromatic diamino-azoxy or diamino-azo body and saponifying subsequently the acyl group, when using an O-acyl derivative. Alternatively a nitroarylide of 2 : 3-oxynaphthoic acid is treated with a reducing agent in an alkaline solution. The reducing agent may be dextrose, arsenious acid, zinc dust, formaldehyde, etc. The products can be combined with any diazo compound yielding a new azo dyestuff. The dyestuffs can be produced on the fibre. A number of examples are given.

(*Continued on p* 385)

(Continued from p. 384)

248,874. Anthraquinone Derivatives, Manufacture and Production of. H. Dodd, W. C. Sprent, and the United Alkali Co., Ltd., Cunard Building, Liverpool. Application date, December 29, 1924.

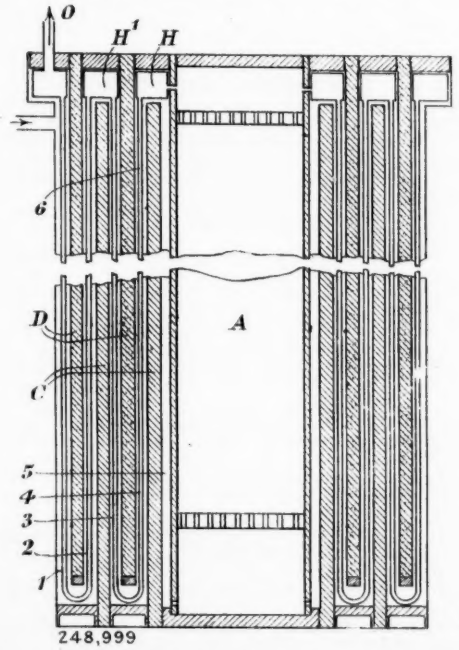
In the production of dyestuffs by condensing quinizarin with different aromatic amines it has been found that the metals iron and nickel have a specific action in directing condensation. If an iron vessel is used, the simple condensation product is obtained in a pure state and free from the double condensation product, and by using a nickel vessel in the absence of iron a double condensation takes place. In an example, a mixture of quinizarin, dry parachloraniline, and boric acid is heated in an iron vessel gradually to 130° C. The melt is run into dilute hydrochloric acid, and the excess of parachloraniline dissolved out. The simple condensation product is obtained with a yield of 80 per cent. The double condensation product is obtained in a similar manner in a nickel vessel.

248,975. Arsenic Preparations, Manufacture of. J. Y. Johnson, London. From Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, June 10, 1925.

The process is for the preparation of arsenic products containing the yellow modification of elementary arsenic. It has been found that yellow arsenic can be obtained by passing the vapour of carbon disulphide, benzene, or other volatile solvent, over arsenic kept at a red heat, and condensing the vapours. The process must be controlled so that the arsenic remains dissolved in the condensate on cooling. The arsenic solution is only slightly sensitive to light, so that daylight need not be excluded. These arsenic solutions either alone or as aqueous emulsions with protective colloids can be used as insecticides or fungicides. The solvent can be expelled from the emulsion by a current of air to obtain a colloidal solution containing yellow arsenic.

248,999. Heat Interchangers, Apparatus and Process for Carrying Out Catalytic Gas Reactions. Synthetic Ammonia and Nitrates, Ltd., and F. H. Bramwell, Billingham, Stockton-on-Tees, Durham. Application date, July 22, 1925.

In the heating of gases in a heat interchanger, the object is to minimise the pressure drop and consequent recompression



248,999

of the gases when they are required for further use at the original pressure, *e.g.*, in the synthesis of ammonia. It has been found that this can be done with a heat efficiency of 80–90 per cent. by passing the gases through a number of small diameter tubes in parallel. The cylindrical catalyst space A is surrounded by a number of annuli 1—5, which are separated by baffle plates C, D, extending from the bottom and top respectively. The cold compressed gases pass inwards through the series of annuli to the space A at the bottom. Gases leave at the top and enter a header H, from which they pass into a large number of U-tubes 6 to another header H¹ and thence through a further series of U-tubes to the outlet O. About 300 separate tubes are employed in an annular space 3 feet in mean diameter and the pressure drop in the apparatus is very small.

249,039. Methylals, Manufacture of. H. Wade, London. From S. Karpen and Bros., 636 West 22nd Street, Chicago, Ill., U.S.A. Application date, October 23, 1925.

Methylals are produced by the reaction between methylene chloride and alcohol and an alkali. The kind of methylal depends on the nature of the alcohol used, and a yield of 90 per cent. can be obtained. The reaction is effected at 100°–125° C. and a pressure of 100 lb. per square inch. The salt formed in the reaction is separated, and the methylal separated from the filtrate by fractional distillation. The methylals can be hydrolysed to form aldehyde and the corresponding alcohol.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention :—234,772 (Farbwerke vorm. Meister, Lucius, and Brüning), relating to manufacture of complex gold compounds, see Vol. XIII, p. 133; 240,401 (Consortium für Nassmetallurgie), relating to production of lead compounds from ores, metallurgical products, waste products from chemical processes, etc., see Vol. XIII, p. 581.

International Specifications not yet Accepted

247,176. Hydrogen, Carbon Monoxide, and Methyl Alcohol. G. Patart, 50, Rue Spontini, Paris. International Convention date, February 7, 1925.

Methane is mixed with half its volume of oxygen and passed into coke, charcoal, coal, or a refractory substance at 1,000° C. The gases are preheated by the issuing gases, and are injected through two water-cooled nozzles in the lower part of the chamber. The issuing gases consist of carbon monoxide and hydrogen in the proportions of 1 : 2 and may be used for the catalytic production of methyl alcohol. Part of the carbon may be burned by an excess of oxygen to maintain the reaction temperature if necessary. The ash may be withdrawn with the gases, or may be melted by periodically introducing an excess of oxygen.

247,177. Alcohols. G. Patart, 50, Rue Spontini, Paris. International Convention date, February 7, 1925.

In the catalytic interaction of carbon monoxide and hydrogen under pressure, the low molecular weight compounds are separated from the products and re-subjected to the catalytic treatment to obtain higher oxygenated organic compounds, particularly alcohols. The separated products are heated to a temperature at or above that of the reaction chamber by passing them continuously through a heated vessel. The catalyst may be a mixture of zinc oxide with potassium oxide, copper oxide, or copper.

247,178. Methyl Alcohol and Hydrocarbons. G. Patart, 50, Rue Spontini, Paris. International Convention date, February 7, 1925.

Unsaturated hydrocarbons are introduced into the mixture of carbon monoxide and hydrogen in the production of methyl alcohol, and liquid hydrocarbons are then produced in addition. Thus 10–40 per cent. of ethylene, acetylene or their homologues, benzene, or toluene may be added. The pressure should be as high, and the temperature as low as possible for the satisfactory production of methyl alcohol. A mixture of ethylene 1 part, carbon monoxide 1 part, and hydrogen 2 parts is passed over a catalyst obtained by reducing basic zinc chromate with hydrogen or with the above mixture, and heated to 300° C. The condensate separates into an upper fluorescent layer, and a lower layer of methyl alcohol. The ethylene can be obtained by catalytic dehydration of ethyl alcohol, by cracking oils or by distilling coal mixed with heavy petroleum oils. The hydrocarbon product can be used as a motor fuel.

247,188. PYRIDINE DERIVATIVES. C. Räth, 42, Invalidenstrasse, Berlin. International Convention date, February 5, 1925.

2-halogen-5-nitropyridine is treated with hydrazine hydrate in the presence of water or alcohol to obtain 2-hydrazino-5-nitropyridine.

247,217. CATALYTIC APPARATUS. I. G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. International Convention date, February 7, 1925.

In catalytic processes where carbon monoxide is employed under pressure and below 150° C., iron apparatus may be used, but if the temperature is above 150° C., the apparatus is made of, or lined with, copper, silver, aluminium, or their alloys, or steel containing chromium, manganese, tungsten, molybdenum or vanadium. If the temperature is above 150° C., but not too high, the lining may be of zinc, tin, lead, or alloys. The reacting gases must be dry, *e.g.*, by treating them with calcium chloride, or in the case of the production of methyl alcohol, by treating them with the product.

247,219. PHOSPHORIC ACID. I. G. Farbenindustrie Akt.-Ges., 31, Gutleutstrasse, Frankfurt-on-Main, Germany. Assignees of Chemische Fabrik, Griesheim-Elektron, 31, Gutleutstrasse, Frankfurt-on-Main, Germany. International Convention date, February 6, 1925.

Gases produced by the reduction of phosphorites with carbon at high temperatures and containing phosphorus or phosphorus pentoxide are passed through a filter chamber at a temperature above the dew point of phosphorus. The coke or phosphorites with which the furnace is charged may be used as the filtering material, and may thus be dried before transferring to the furnace. The filter may be heated if necessary.

247,225–6. AMMONIA SYNTHESIS. F. Uhde, Bovinghausen, Westphalia, Germany. International Convention date, February 9, 1925.

247,225. Catalysts for ammonia synthesis, *e.g.*, complex cyanide compounds of the iron group, for use at comparatively low temperatures are prepared from solutions of the original materials in organic solvents free from water.

247,226. Nitrogen and hydrogen for ammonia synthesis are purified by passing, at 200°–300° C. and under pressure, through a solution of an alkali or alkaline earth metal in a molten alkali amide.

247,227–8–9. AMMONIUM NITRATE. Azogeno Soc. Anon. per la Fabricazione Dell'ammoniaca Sintetica e Prodotti Derivati and C. Toniolo, 18, Viale L. Maino, Milan, Italy. International Convention date, February 7, 1925.

247,227. Nitric acid diluted with ammonium nitrate solution is treated with gaseous ammonia and air or other non-condensing gas. The heat of the reaction evaporates part of the water.

247,228. Ammonium nitrate solution is poured or sprayed over a mass of pulverised cold or hot ammonium nitrate through which a current of hot or cold air is passed.

247,229. Dry ammonium nitrate is added to a concentrated solution of the salt and heated till molten. The molten salt is sprayed into dry air or mixed with pulverised substances and the latent heat of fusion effects a drying of the material.

247,230. CALCIUM NITRATE AND PHOSPHORIC ACID. Azogeno Soc. Anon. per la Fabricazione Dell'ammoniaca Sintetica e Prodotti Derivati and C. Toniolo, 18, Viale L. Maino, Milan, Italy. International Convention date, February 7, 1925.

Calcium phosphate as a suspension or mud is treated with nitrogen oxides and air or oxygen, obtained by electric arc oxidation of nitrogen. Calcium nitrate and di- or mono-calcium phosphate or phosphoric acid are obtained.

LATEST NOTIFICATIONS.

250,180. Process for rendering dusting powders adherent. I. G. Farbenindustrie Akt.-Ges. April 3, 1925.

250,182. Process for fixing nitrogen. Gewerkschaft Sachsenweimar. April 4, 1925.

250,194. Manufacture of alloys of copper, nickel and aluminium. International Nickel Co. March 31, 1925.

250,199. Process for treating formic acid. Chemische Fabrik auf Actien (vorm. E. Schering). April 6, 1925.

250,208. Process for purifying silicates of baryta. Deguide, C. April 3, 1925.

250,211. Process for the production of complex hydrofluoric acids. Meyerhofer, A. F. April 1, 1925.

250,219. Process of manufacture of xanthate of cellulose. Moro, P. March 31, 1925.

250,241. Manufacture of nucleal-alkylated or nucleal-cycloalkylated arylsulphonic acids. I. G. Farbenindustrie Akt.-Ges. April 1, 1925.

250,250. Manufacture of ortho-aminophenyl-propionic acid, its substitution products, homologues, or analogues. I. G. Farbenindustrie Akt.-Ges. April 6, 1925.

250,251. Manufacture of vat dyestuff preparations. Soc. of Chemical Industry in Basle. April 2, 1925.

250,265. Synthetic resins and processes for producing the same. Commercial Solvents Corporation. April 1, 1925.

Specifications Accepted with Date of Application

247,523. Alkali hydrosulphites, Process for the manufacture of. Farbenfabriken vorm. F. Bayer and Co. February 13, 1925.

237,571. Treatment of ores or other materials with liquids. A. Ramen. July 23, 1924.

237,594. Ortho-oxyazo dyestuffs and intermediate products, Manufacture of. Akt.-Ges. für Anilin Fabrikation. July 28, 1924.

241,547. Devices for the chemical treatment of gases. Metropolitan Vickers Electrical Co., Ltd. October 14, 1924.

249,584. Unsymmetrical arsenobenzene compounds, Process for the production of. Deutsche Gold- und Silber- Scheideanstalt vorm. Roessler, and A. Albert. November 24, 1924.

249,588. New derivatives of organic arseno compounds, Process for the production of. Deutsche Gold- und Silber- Scheideanstalt vorm. Roessler, and A. Albert. November 28, 1924. Addition to 199,092.

249,604. Cracking process. J. T. Shevlin. (*Universal Oil Products Co.*) December 29, 1924.

249,609 and 249,764. Electrolytic production of zinc from ores. S. Field, E. F. Petersson, W. E. Harris, and Metals Extraction Corporation, Ltd. December 29, 1924.

249,647. Colloidal or semi-colloidal substances, precipitates or sediments, Manufacture and manipulation of—and the separation and recovery of the liquid or solid components. Spencer Chapman and Messel, Ltd., and J. B. Liebert. February 19, 1925.

249,710. Carbonising apparatus. O. H. Hertel. June 15, 1925.

249,717. ω-aminoalkylamino-naphthalene compounds and substitution products thereof. W. Carpmael. (*Farbenfabriken vorm. F. Bayer and Co.*) June 29, 1925.

Applications for Patents

American Smelting and Refining Co. and Marks, E. C. R. Recovery of zinc as sulphate from dross. 9,203. April 7.

American Smelting and Refining Co. and Marks, E. C. R. Recovering metals. 9,204. April 7.

Baddiley, J., British Dyestuffs Corporation, Ltd., and Chorley, P. Manufacture of azo dyes, etc. 9,295. April 8.

Becker, E. Production of oil-gas by distillation of hydrocarbons. 9,039. April 6.

Brightman, R., and Ellis, G. H. Manufacture of azo dyes, etc. 9,295. April 8.

British Celanese, Ltd., and Ellis, G. H. Treatment of cellulose derivatives. 9,503, 9,504. April 10.

Carpmael, W., and I. G. Farbenindustrie Akt.-Ges. Manufacture of sulphur dye-stuffs. 9,424. April 9.

Chemische Fabrik Grunau, Landshoff, and Meyer Akt.-Ges. and Potts, H. E. Manufacture of N-monoalkyl-*p*-aminophenol. 9,470. April 10.

Courtaulds, Ltd., Diamond, C., and Glover, W. H. Manufacture of cellulose derivatives. 9,535. April 10.

Deaves, S. W. Dye vats, etc. 9,138. April 7.

Drescher, H. A. E., Harris, J. E. G., Scottish Dyes, Ltd., Thomas, J., and Wylam, B. Production of quinone derivatives. 9,433. April 9.

Moser, F. R., and Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Manufacture of finely divided substances from natural emulsions, etc. 9,239. April 7.

Mulligan, F. Manufacture of hydraulic cement, etc., from gypsum. 9,359. April 9.

Shadbolt, S. M. Recovery of by-products from waste liquor, etc., from sulphate of ammonia, etc., plants. 9,523. April 10.

Soc. Anon. des Fours à Coke Semet-Solvay et Piette. Production of ammonium sulphate. 9,172. April 7. (Belgium, March 22.)

Soc. of Chemical Industry in Basle. Manufacture of 2 : 3-aminonaphthoic acid. 9,235. April 7. (Switzerland, April 8, 1,925.)

Soie de Chatillon. Maturation of alkali cellulose for preparation of artificial silk. 9,534. April 10. (Italy, April 10, 1925.)

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID BORIC, COMMERCIAL.—Crystal, £37 per ton, Powder, £39 per ton.

ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength, and locality.

ACID NITRIC, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.

BISULPHITE OF LIME.—£7 10s. per ton, packages extra, returnable.

BLEACHING POWDER.—Spot, £9 10s. d/d; Contract, £8 10s. d/d, 4-ton lots.

BORAX, COMMERCIAL.—Crystal, £23 per ton. Powder, £24 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

CALCIUM CHLORATE (SOLID).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carr. paid.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 64 O.P.—Industrial, 2s. 5d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE.—4½d. per lb.

POTASSIUM CHLORATE.—3¾d. per lb., ex wharf, London, in cwt. kegs.

SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.

SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.

SODA CRYSTALS.—£5 to £5 5s. per ton ex railway depots or ports.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE.—£10 10s. per ton, carr. paid.

SODIUM BICHROMATE.—3½d. per lb.

SODIUM BISULPHITE POWDER 60/62%.—£17 per ton for home market, 1-cwt. iron drums included.

SODIUM CHLORATE.—3d. per lb.

SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.

SODIUM PHOSPHATE.—£14 per ton, f.o.r. London, casks free.

SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.

SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.

SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.

SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—4⅞d. to 5d. per lb. Crude 60's, 1s. 4½d. to 1s. 6d.

ACID CRESYLIC 97/99.—1s. 6½d. to 1s. 9d. per gall. Pale, 95%, 1s. 5d. to 1s. 7d. per gall. Dark, 1s. 3d. to 1s. 5d. per gall. Steady.

ANTHRACENE.—A quality, 3d. to 4d. per unit.

ANTHRACENE OIL, STRAINED.—7d. to 8d. per gall. Unstrained, 6½d. to 7½d. per gall.

BENZOL.—Crude 65's, 1s. to 1s. 3½d. per gall., ex works in tank wagons. Standard Motor, 1s. 9d. to 1s. 11d. per gall., ex works in tank wagons. Pure, 1s. 10d. to 2s. 4d. per gall., ex works in tank wagons.

TOLUOL.—90%, 1s. 9½d. to 2s. per gall. Pure, 2s. to 2s. 2d. per gall.

XYLOL.—2s. to 2s. 6d. per gall.

CREOSOTE.—Cresylic, 20/24%, 9d. to 10d. per gall. Standard specification, middle oil, heavy, 6½d. to 7⅛d. per gall.

NAPHTHA.—Crude, 9d. to 1s. per gall. Solvent 90/160, 1s. 5d. to 1s. 10d. per gall. Steady demand. Solvent 90/190, 1s. to 1s. 4d. per gall.

NAPHTHALENE CRUDE.—Drained Creosote Salts, £3 10s. to £4 per ton. Whizzed or hot pressed, £5 to £7 10s.

NAPHTHALENE.—Crystals and Flaked, £11 10s. to £13 per ton, according to districts.

PITCH.—Medium soft, 82s. 6d. to 87s. 6d. per ton, according to district. Market active.

PYRIDINE.—90/140, 19s. 6d. to 21s. per gall. Firmer. Heavy, 7s. to 10s. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—7s. per lb. 100%.

ACID BENZOIC.—1s. 9d. per lb.

ACID GAMMA.—8s. per lb.

ACID H.—3s. 3d. per lb. 100% basis d/d.

ACID NAPHTHIONIC.—2s. 2d. per lb. 100% basis d/d.

ACID NEVILLE AND WINTHER.—4s. 9d. per lb. 100% basis d/d.

ACID SULPHANILIC.—9d. per lb. 100% basis d/d.

ANILINE OIL.—7d. per lb. naked at works.

ANILINE SALTS.—7d. to 7½d. per lb. naked at works.

BENZALDEHYDE.—2s. 1d. per lb. Fair home inquiry.

BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.

o-CRESOL 29/31° C.—3d. to 3½d. per lb. Demand quiet.

m-CRESOL 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

p-CRESOL 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

DICHLORANILINE.—2s. 3d. per lb.

DIMETHYLANILINE.—1s. 11d. to 2s. per lb. d/d. Drums extra.

DINITROBENZENE.—9d. per lb. naked at works.

DINITROCHLORBENZENE.—£84 per ton d/d.

DINITROTOLUENE.—48/50° C. 8d. per lb. naked at works. 66/68° C. 9d. per lb. naked at works.

DIPHENYLANILINE.—2s. 10d. per lb. d/d.

a-NAPHTHOL.—2s. per lb. d/d. Fair home inquiry.

B-NAPHTHOL.—11d. to 1s. per lb. d/d. Fair home inquiry.

a-NAPHTHYLAMINE.—1s. 3d. per lb. d/d. Fair home inquiry.

B-NAPHTHYLAMINE.—3s. 2d. per lb. d/d. Fair home inquiry.

o-NITRANILINE.—5s. 9d. per lb.

m-NITRANILINE.—3s. 3d. per lb. d/d.

p-NITRANILINE.—1s. 9d. per lb. d/d. Fair home inquiry.

NITROBENZENE.—5d. per lb. naked at works. Fair home inquiry.

NITRONAPHTHALENE.—10d. per lb. d/d.

R. SALT.—2s. 4d. per lb. 100% basis d/d.

SODIUM NAPHTHIONATE.—1s. 9d. per lb. 100% basis d/d.

o-TOLUIDINE.—8d. per lb. naked at works.

p-TOLUIDINE.—2s. 2d. per lb. naked at works.

m-XYLIDINE ACETATE.—2s. 11d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 15s. to £9. Firmer. Grey, £17 10s. per ton. Better inquiry. Liquor, 9d. per gall. 32° Tw.

ACETONE.—£81 per ton.

CHARCOAL.—£7 5s. to £9 per ton, according to grade and locality. Demand good.

IRON LIQUOR.—1s. 6d. per gall. 32° Tw. 1s. 2d. per gall., 24° Tw.

RED LIQUOR.—9½d. to 1s. per gall.

WOOD CREOSOTE.—2s. 9d. per gall. Unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 10d. per gall. 60% O.P. Solvent, 4s. 6d. per gall. 40% O.P. Very quiet.

WOOD TAR.—£3 to £5 per ton, according to grade.

BROWN SUGAR OF LEAD.—£40 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6d. to 1s. 5d. per lb., according to quality, Crimson, 1s. 3d. to 1s. 7½d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—2s. per lb.

BARYTES.—£3 10s. to £6 15s. per ton, according to quality.

CADMIUM SULPHIDE.—2s. 9d. per lb.

CARBON BISULPHIDE.—£20 to £25 per ton, according to quantity.

CARBON BLACK.—5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£46 to £55 per ton, according to quantity, drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—3s. 9d. per lb.

INDIARUBBER SUBSTITUTES, WHITE AND DARK.—5¾d. to 6¼d. per lb.

LAMP BLACK.—£35 per ton, barrels free.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE, 30%.—£22 10s. per ton.

MINERAL RUBBER "RUBPRON."—£13 12s. 6d. per ton f.o.r. London.

SULPHUR.—£9 to £11 per ton, according to quality.

SULPHUR CHLORIDE.—4d. per lb., carboys extra.

SULPHUR PRECIP. B.P.—£47 10s. to £50 per ton.

THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb. carriage paid.

THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.

VERMILION, PALE OR DEEP.—5s. 3d. per lb.

ZINC SULPHIDE.—1s. 1d. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, 80% B.P.—£39 per ton ex wharf London in glass containers.

ACID, ACETYL SALICYLIC.—2s. 4d. to 2s. 5d. per lb. Keen competition met. Good demand.

ACID, BENZOIC B.P.—2s. to 2s. 3d. per lb., according to quantity.

ACID, BORIC B.P.—Crystal, £43 per ton; Powder, £47 per ton. Carriage paid any station in Great Britain, in ton lots.

ACID, CAMPHORIC.—19s. to 21s. per lb.

ACID, CITRIC.—1s. 4d. to 1s. 4½d. per lb., less 5%.

ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.

ACID, PYROGALLIC, CRYSTALS.—6s. 7d. per lb. Resublimed, 7s. 3d.

ACID, SALICYLIC.—1s. 3½d. to 1s. 4½d. per lb. Technical.—10¾d. per lb.

ACID, TANNIC B.P.—2s. 10d. per lb.

ACID, TARTARIC.—1s. 0½d. per lb., less 5%. Market firm.

AMIDOL.—6s. 6d. per lb., d/d.

ACETANILIDE.—1s. 7d. to 1s. 8d. per lb. for quantities.

AMIDOPYRIN.—12s. 6d. per lb.

AMMONIUM BENZOATE.—3s. 3d. to 3s. 6d. per lb., according to quantity.

AMMONIUM CARBONATE B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.

ATROPINE SULPHATE.—11s. per oz. for English make.

BARBITONE.—10s. per lb.

BENZONAPHTHOL.—3s. 3d. per lb. spot.

BISMUTH CARBONATE.—12s. 6d. to 14s. 3d. per lb.

BISMUTH CITRATE.—9s. 6d. to 11s. 3d. per lb.

BISMUTH SALICYLATE.—10s. 3d. to 12s. per lb.

BISMUTH SUBNITRATE.—10s. 9d. to 12s. 6d. per lb. according to quantity.

BORAX B.P.—Crystal, £27; Powder, £28 per ton. Carriage paid any station in Great Britain, in ton lots.

BROMIDES.—Potassium, 1s. 8½d. to 1s. 11d. per lb.; sodium, 1s. 11d. to 2s. 2d. per lb.; ammonium, 2s. 2d. to 2s. 5d. per lb., all spot.

CALCIUM LACTATE.—1s. 3d. to 1s. 4½d.

CHLORAL HYDRATE.—3s. 3d. to 3s. 6d. per lb., duty paid.

CHLOROFORM.—2s. 3d. to 2s. 7½d. per lb., according to quantity.

CREOSOTE CARBONATE.—6s. per lb.

FORMALDEHYDE.—£40 per ton, in barrels ex wharf.

GUAIACOL CARBONATE.—7s. 6d. per lb.

HEXAMINE.—2s. 4d. to 2s. 6d. per lb.

HOMATROPINE HYDROBROMIDE.—30s. per oz.

HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.

HYDROGEN PEROXIDE (12 VOLS.).—1s. 8d. per gallon f.o.r. makers' works, naked.

HYDROQUINONE.—4s. 3d. per lb., in cwt. lots.

HYPOPHOSPHITES.—Calcium, 3s. 6d. per lb., for 28-lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.

IRON AMMONIUM CITRATE B.P.—2s. to 2s. 3d. per lb. Green, 2s. 4d. to 2s. 9d. per lb. U.S.P., 2s. 1d. to 2s. 4d. per lb.

MAGNESIUM CARBONATE.—Light Commercial, £31 per ton net.

MAGNESIUM OXIDE.—Light Commercial, £67 10s. per ton, less 2½%, price reduced; Heavy Commercial, £22 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.

MENTHOL.—A.B.R. recrystallised B.P., 21s. 6d. net per lb., Synthetic, 15s. to 17s. 6d. per lb., according to quality. English make.

MERCURIALS.—Red oxide, 5s. 8d. to 5s. 10d. per lb.; Corrosive sublimate, 3s. 9d. to 3s. 11d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 4s. 3d. to 4s. 5d. per lb.

METHYL SALICYLATE.—1s. 7d. per lb.

METHYL SULPHONAL.—16s. 6d. per lb.

METOL.—9s. per lb. British make.

PARAFORMALDEHYDE.—1s. 11d. for 100% powder.

PARALDEHYDE.—1s. 1d. to 1s. 4d. per lb.

PHENACETIN.—4s. to 4s. 3d. per lb.

PHENAZONE.—6s. to 6s. 3d. per lb.

PHENOLPHTHALEIN.—4s. to 4s. 3d. per lb.

POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—80s. per cwt., less 2½% for ton lots.

POTASSIUM CITRATE.—1s. 11d. to 2s. 2d. per lb.

POTASSIUM FERRICYANIDE.—1s. 9d. per lb. in cwt. lots. Quiet.

POTASSIUM IODIDE.—16s. 8d. to 17s. 5d. per lb., according to quantity.

POTASSIUM METABISULPHITE.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.

POTASSIUM PERMANGANATE.—B.P. crystals, 7½d. per lb., spot, slightly easier.

QUININE SULPHATE.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.

RESORCIN.—3s. 9d. per lb. In fair quantities.

SACCHARIN.—55s. per lb. Better demand.

SALOL.—3s. per lb.

SODIUM BENZOATE, B.P.—1s. 10d. to 2s. 2d. per lb.

SODIUM CITRATE, B.P.C., 1911.—1s. 8d. to 1s. 11d. per lb., B.P.C., 1923. 1s. 11d. to 2s. 2d per lb., according to quantity.

SODIUM FERROCYANIDE.—4d. per lb. carriage paid.

SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£14 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.

SODIUM NITROPRUSSIDE.—16s. per lb.

SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—75s. to 80s. per cwt., according to quantity.

SODIUM SALICYLATE.—Powder, 1s. 9d. to 1s. 10d. per lb. Crystal, 1s. 10d. to 1s. 11d. per lb. Good demand.

SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 2d. per lb.

SODIUM SULPHITE, ANHYDROUS, £27 10s. to £28 10s. per ton, according to quantity; 1-cwt. kegs included.

SULPHONAL.—11s. 6d. per lb. Limited demand.

TARTAR EMETIC, B.P.—Crystal or Powder, 1s. 10d. to 1s. 11d. per lb.

THYMOL.—12s. to 13s. 9d. per lb. Strong demand.

Perfumery Chemicals

ACETOPHENONE.—9s. per lb.

AUBEPINE (EX ANETHOL).—9s. 6d. per lb.

AMYL ACETATE.—3s. per lb.

AMYL BUTYRATE.—6s. 6d. per lb.

AMYL SALICYLATE.—3s. 3d. per lb.

ANETHOL (M.P. 21/22° C.).—5s. 6d. per lb.

BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—2s. 3d. per lb.

BENZYL ALCOHOL FREE FROM CHLORINE.—2s. 3d. per lb.

BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.

BENZYL BENZOATE.—2s. 9d. per lb.

CINNAMIC ALDEHYDE NATURAL.—17s. 6d. per lb.

COUMARIN.—11s. 9d. per lb.

CITRONELLOL.—15s. per lb.

CITRAL.—9s. per lb.

ETHYL CINNAMATE.—9s. per lb.

ETHYL PHTHALATE.—3s. per lb.

EUGENOL.—9s. 6d. per lb.

GERANIOL (PALMAROSA).—10s. 3d. per lb.

GERANIOL.—7s. to 16s. per lb.

HELIOTROPINE.—6s. per lb.

ISO EUGENOL.—14s. per lb.

LINALOL EX BOIS DE ROSE.—17s. 6d. per lb.

LINALYL ACETATE.—18s. per lb.

METHYL ANTHRANILATE.—9s. 3d. per lb.

METHYL BENZOATE.—5s. per lb.

MUSK KETONE.—34s. 6d. per lb.

MUSK XYLOL.—8s. per lb.

NEROLIN.—4s. per lb.

PHENYL ETHYL ACETATE.—12s. per lb.

PHENYL ETHYL ALCOHOL.—9s. 6d. per lb.

RHODINOL.—27s. 6d. per lb.

SAFROL.—1s. 8d. per lb.

TERPINEOL.—1s. 6d. per lb.

VANILLIN.—21s. 6d. to 23s. per lb. Good demand.

Essential Oils

ALMOND OIL.—12s. 6d. per lb.

ANISE OIL.—3s. 6d. per lb.

BERGAMOT OIL.—32s. 6d. per lb.

BOURBON GERANIUM OIL.—11s. 9d. per lb.

CAMPHOR OIL.—60s. per cwt.

CINNAMON OIL, LEAF.—5d. per oz.

CASSIA OIL, 80/85%.—9s. 6d. per lb.

CITRONELLA OIL.—Java, 85/90%, 3s. 2d. Ceylon, 2s. 2d. per lb.

CLOVE OIL.—7s. per lb.

EUCALYPTUS OIL, 70/75%.—1s. 10d. per lb.

LAVENDER OIL.—French 38/40%, Esters, 22s. 6d. per lb.

LEMON OIL.—9s. per lb.

LEMONGRASS OIL.—4s. 9d. per lb.

ORANGE OIL, SWEET.—13s. per lb.

OTTO OF ROSE OIL.—Bulgarian, 65s. per oz. Anatolian, 35s. per oz.

PALMA ROSA OIL.—12s. per lb.

PEPPERMINT OIL.—Wayne County, 75s. per lb. Japanese, 12s. 6d. per lb.

PETITGRAIN OIL.—9s. per lb.

SANDAL WOOD OIL.—Mysore, 26s. per lb. Australian, 18s. 6d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd. and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, April 16, 1926.

THERE has been a gradual expansion in the demand since the commencement of business after the Easter recess, and although inquiries are mainly for near delivery and for small quantities the undertone is quite firm. In a number of cases it is noticeable that stocks are extremely light. Export trade is still disappointing with most of the business which is offering being at unacceptable prices.

General Chemicals

ACETONE has been in fair request and the price keeps steady with supplies light.

ACID ACETIC.—The usual day to day demand has been received and prices show no change at £37 to £39 for 80% technical and £38 to £40 per ton for the pure quality.

ACID FORMIC is firmer at about £50 10s., and a fair demand has been received.

ACID LACTIC has been steadily called for and the price shows no change at £43 10s. for 50% by weight technical quality.

ACID OXALIC meets with extreme competition and demand is not so good.

ACID TARTARIC is firmer with an increasing demand both for spot and forward delivery.

ALUMINA SULPHATE shows no change at £5 15s. per ton and has been in steady request.

AMMONIUM CHLORIDE.—Demand is dull for all grades with price for the fine white crystals remaining unchanged at about £18 per ton.

ARSENIC.—A somewhat better inquiry has been received, although actual business is still negligible; the price shows no improvement at £13 10s. to £14 per ton.

BARIUM CHLORIDE is in slightly better supply with price a shade easier for forward delivery; spot stocks are still light and fetch a premium.

EPSOM SALTS.—Higher prices are expected and demand is quite good. Spot stocks are quiet at about £5 15s. to £6 per ton.

FORMALDEHYDE.—No improvement in the demand can be reported and price is steady at £41 to £43 per ton according to quantity.

IRON SULPHATE is unchanged, with material still in short supply.

LEAD ACETATE has been in fair request and price holds firm in spite of the decline in pig lead; white acetate is offered at £44 to £45 and the Brown quality at about £43.

METHYL ALCOHOL shows no improvement and price is easy at £45.

METHYL ACETONE maintains its firm position and supplies are offering at £55 to £60 per ton.

POTASSIUM CARBONATE AND CAUSTIC are in steady request and prices are unchanged.

POTASSIUM CHLORATE.—Spot stocks are still small and command a premium, although slightly lower prices are offering for forward delivery.

POTASSIUM PERMANGANATE.—A better demand is reported, especially for the commercial quality, but no change is noticeable in price. Commercial quality is quoted at about 5¾d. to 6d. per lb., and the B.P. at 7d. to 7¼d. per lb.

POTASSIUM PRUSSIATE.—Good business is being done in this material and the price is steady at 7¼d. per lb.

SODIUM ACETATE is still scarce with works fully sold for some time ahead; spot stocks are obtainable at £21 to £22 per ton.

SODIUM BICHROMATE is slow of sale with competition keen.

SODIUM CHLORATE continues firm and scarce at 3d. to 3½d. per lb.

SODIUM NITRITE is unchanged at £21 per ton.

SODIUM PHOSPHATE.—Demand is expanding and price is firm at £13 10s. to £14 per ton.

SODIUM PRUSSIATE.—A better business has been done in this product and price holds steady at 4d. per lb.

SODIUM SULPHIDE.—Demand is still on the slow side with Continental material offering cheaper for quantities.

Coal Tar Products

The market generally is quiet, and there is no great volume of fresh business passing.

90's BENZOL appears to be rather more plentiful, but the price remains very firm at 1s. 9½d. per gallon on rails.

PURE BENZOL is unchanged at 2s. 1d. to 2s. 2d. per gallon on rails.

CREOSOTE OIL is also rather more plentiful. The price, however, is unchanged at 5¾d. to 6d. per gallon on rails in the North, while the price in London is 6¾d. to 7d. per gallon.

CRESYLIC ACID has been a somewhat disappointing market recently, particularly as regards the quality made specially for the American market. A considerable amount of promised business for this quality has not materialised, which is now quoted at 1s. 9d. to 1s. 10d. per gallon on rails, while the Dark quality 95/97% is quoted at 1s. 7d. to 1s. 8d. per gallon on rails. The ordinary Pale quality 97/99%, for the home trade, or for export to countries other than America, has no great demand, and is worth about 1s. 6d. per gallon on rails, while the Dark quality 95/97% is quoted at 1s. 4d. per gallon on rails.

SOLVENT NAPHTHA is firm at 1s. 5d. per gallon on rails.

HEAVY NAPHTHA remains stationary, at 1s. to 1s. 1d. per gallon on rails.

NAPHTHALENES are unchanged, the lower grades being worth from £3 10s. to £4 5s. per ton, 76/78 quality about £6 per ton, and 74/76 quality about £5 to £5 10s. per ton.

PITCH.—The demand remains inactive and for the small amount of business transacted prices have shown a slightly weaker tendency.

Latest Oil Prices

LONDON.—LINSEED OIL closed easier at 2s. 6d. to 5s. decline. Spot, £30 10s., ex mill; April, £29 5s.; May-August, £29 15s.; September-December, £30. RAPE OIL scarce. Crude, crushed, spot, £49 nominal; technical, refined, £50. COTTON OIL steady. Refined common, edible, £42; Egyptian, crude, £36; deodorised, £44. TURPENTINE dull at 3d. per cwt. advance. American, spot and May-June, 64s. 3d; and July-December, 60s.

HULL.—LINSEED OIL, spot and April, £30; May-August, £30 2s. 6d.; September-December, £30 7s. 6d. COTTON OIL.—Bombay crude, £35; Egyptian crude, £35 15s.; edible refined, £39 5s.; technical, £38 10s. PALM KERNEL OIL.—Crushed naked, 5½%, £42. GROUNDNUT OIL.—Crushed-extracted, £44; deodorised, £48. SOYA OIL.—Extracted and crushed, £36 10s.; deodorised, £40. RAPE OIL.—Crude extracted, £46; refined, £48 per ton, net cash terms. CASTOR OIL.—Pharmaceutical, 50s. to 51s.; firsts, 45s. to 46s.; and seconds, 42s. to 43s. per cwt., net, ex mills. COD OIL unaltered.

Nitrogen Products Market

Export.—The demand for sulphate of ammonia continues to be good and the market remains firm on the basis of £12 10s. per ton f.o.b. U.K. port in single bags. The Continent and the Far East are still buyers. It seems likely that the market will be very firm for the remainder of the season, as internal consumption, both in the United Kingdom and in Continental countries, has been somewhat heavier than anticipated a few weeks ago.

Home.—The home demand in the United Kingdom continues very strongly, and merchants in all parts of the country report an increased trade. The fine weather in February caused the demand to start very well, and ever since producers have been hard put to it to meet the demand. Home prices will remain unchanged until May 31, 1926.

Nitrate of Soda.—The nitrate market continues firm. Cargoes c.i.f. chief European ports are changing hands on the basis of £11 11s./£11 14s. per ton. There seems no likelihood of any but small changes in price during the remainder of the season.

IN THE COUNCIL CHAMBER, Caxton House, Westminster, on Tuesday next, at 4.30 p.m., a meeting will take place at which the present position of the British flint glass industry will be considered, and an appeal made to the Government to take measures to safeguard from extinction an efficient industry, which is being slowly strangled through unfair foreign competition; all interested are invited.

AN ORDINARY MEETING of the Board of Directors of Manchester Chamber of Commerce was held on Wednesday. The Chemical Section, as disclosed by minutes presented, are keenly interested in the fact that the original Key Industries Act comes to the end of its statutory period this year. The Board of Trade are studying the question with a view to the adoption of a new bill to continue the provisions of the Act, possibly in a modified form. The Chemical Section Executive is watching the situation carefully and will take action if any is found to be desirable.

NEW REGULATIONS, which will come into force on January 1, 1927, have been issued by the Board of Trade concerning the fire extinguishing appliances to be provided on ships under survey for Board of Trade passenger certificates. The regulations require portable chemical fire extinguishers for dealing with small fires in passenger and crew quarters, smoke helmets, safety lamps, and emergency appliances. In addition, passenger ships using oil as fuel are required to be provided with appliances for discharging froth or foam in the machinery and boiler rooms. ("Circular Instructions to Surveyors, No. 1,658," H.M. Stationery Office at the usual addresses, price 1d. net.).

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, April 16, 1926.

BUSINESS after resumption has been quite active during the past week and inquiry, particularly for export, has been good. Prices both for home and continental products remain fairly stationary.

Industrial Chemicals

ACID ACETIC.—98/100% quoted £55 to £67 per ton, according to quantity and packing, c.i.f. U.K. port; 80% pure, £40 to £41 per ton; 80% technical, £38 to £39 per ton, packed in casks, c.i.f. U.K. ports.

ACID BORIC.—Crystal, granulated, or small flakes, £37 per ton; powdered £39 per ton, packed in bags, carriage paid, U.K. stations.

ACID CARBOLIC, ICE CRYSTALS.—In little demand and quoted price reduced to about 4⅞d. per lb., delivered or f.o.b. U.K. ports. This price could probably still be shaded for large quantities.

ACID CITRIC, B.P. CRYSTALS.—Rather better demand and quoted price now 1s. 3¼d. per lb., less 5%, ex wharf.

ACID FORMIC, 85%.—Spot material quoted about £49 15s. per ton, ex store. Offered from the Continent at about £49 per ton, ex wharf, prompt shipment.

ACID HYDROCHLORIC.—In little demand. Price, 6s. 6d. per carboy, ex works.

ACID NITRIC 80°.—Remains unchanged at £23 5s. per ton, ex station, full truck loads.

ACID OXALIC 98/100%.—In good demand and price unchanged at about 3¾d. per lb., ex store. On offer for April delivery at about 3½d. per lb., ex wharf.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—In little demand and price unchanged at about 11¼d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE 17/18% IRON FREE.—Some cheap offers from the Continent now quoted about £5 8s. per ton, c.i.f. U.K. ports. Spot material available at about £6 5s. per ton, ex store.

ALUM POTASH, LUMP.—Unchanged at about £7 12s. 6d. per ton, c.i.f. U.K. ports. Spot material quoted £9 per ton, ex store. Powdered quality 5s. per ton less. Powdered quality offered from the Continent at about £7 7s. 6d. per ton, c.i.f. U.K. ports.

AMMONIA ANHYDROUS.—Competition in imported material pretty keen. Now quoted for prompt shipment at about 11½d. per lb., ex wharf. Containers extra and returnable.

AMMONIA CARBONATE.—Lump, £37 per ton. Powdered, £39 per ton, packed in 5 cwt. casks, delivered or f.o.b. U.K. ports. Industrial quality about £10 per ton less.

AMMONIA LIQUID 880°.—Unchanged at about 2½d. to 3d. per lb., delivered according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £24 to £26 per ton, ex station. On offer from the Continent at about £21 15s. per ton, c.i.f. U.K. ports. Fine white crystals offered from the Continent at about £18 10s. per ton, c.i.f. U.K. ports.

ARSENIC, WHITE POWDERED CORNISH.—Spot material unchanged at about £17 per ton, ex store; offered for prompt delivery from works at about £16 10s. per ton, ex wharf.

BARIUM CHLORIDE 98/100%.—Fine white crystals quoted £8 15s. per ton, c.i.f. U.K. ports, prompt shipment from the Continent. Spot material available at about £10 15s. per ton, ex store.

BLEACHING POWDER.—English material unchanged at £9 10s. per ton, ex station. Contracts 20s. per ton less. Continental prices rather higher at about £7 12s. 6d. per ton, c.i.f. U.K. ports.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. ports.

BORAX.—Granulated, £22 10s. per ton; crystals, £23 per ton; powdered, £24 per ton, carriage paid U.K. stations.

CALCIUM CHLORIDE.—English manufacturers' price unchanged at £5 12s. 6d. to £5 17s. 6d. per ton, carriage paid U.K. stations. Continental again lower at about £4 7s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Quoted £3 17s. 6d. per ton, f.o.b. U.K. ports for export. About £3 10s. per ton, f.o.r. works for home consumption.

COPPER SULPHATE 99/100%.—Price for British material £23 10s. per ton, f.o.b. U.K. ports. Moderate inquiry for export. Continental on offer at about £22 per ton, ex wharf.

FORMALDEHYDE 40%.—Unchanged at about £37 per ton, c.i.f. U.K. ports, prompt shipment. Spot material available at about £38 per ton, ex store.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental on offer at about £3 per ton, c.i.f. U.K. ports.

LEAD, RED.—Imported material cheaper at about £38 per ton, ex store.

LEAD, WHITE.—Quoted £37 per ton, c.i.f. U.K. ports. Spot material available at about £38 15s. per ton, ex store.

LEAD ACETATE.—Rather scarce for prompt delivery; white crystals offered from the Continent at £44 10s. per ton, c.i.f. U.K. ports; brown about £39 per ton, c.i.f. U.K. ports.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store, in moderate demand.

POTASH, CAUSTIC 88/92%.—Syndicate prices vary from £25 10s. to £28 15s. per ton c.i.f. U.K. ports, according to quantity and destination. Spot material available at about £29 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 4½d. per lb. delivered.

POTASSIUM CARBONATE, 96/98%.—Spot material quoted £26 10s. per ton, ex store; quoted £25 per ton, ex wharf, to come forward, 90/94% quality on offer at £22 10s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE, 99/100% POWDERED.—Limited quantities available for prompt shipment from the Continent at about £27 per ton, c.i.f. U.K. ports.

POTASSIUM NITRATE, SALTPETRE.—Quoted £22 5s. per ton, c.i.f. U.K. ports, prompt shipment. Spot material available at about £25 per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Spot material now quoted 7½d. per lb., ex store, offered for early delivery at about 7d. per lb. ex wharf.

POTASSIUM PRUSSIATE YELLOW.—Quoted 7½d. per lb., ex store, Spot material on offer from the Continent at about 7¼d. per lb., ex wharf.

SODA CAUSTIC.—76/77%, £17 10s. per ton; 70/72%, £16 2s. 6d. per ton; broken, 60%, £16 12s. 6d. per ton; powdered, 98/99%, £20 17s. 6d. per ton, all carriage paid U.K. stations, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Spot material now available at about £20 per ton ex store. Cheaper prices from the Continent. Now quoted £19 15s. per ton, c.i.f. U.K. ports.

SODIUM BICARBONATE.—Refined recrystallised quality £10 10s. per ton, ex quay or station; H.W. quality 30s. per ton less.

SODIUM BICHROMATE.—English price unchanged at 3½d. per lb., delivered.

SODIUM CARBONATE.—Soda crystals £5 to £5 5s. per ton, ex quay or station; powdered or pea quality, £1 7s. 6d. per ton more; alkali, 58% £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £9 per ton, ex station, minimum 4-ton lots; pea crystals, £4 10s. per ton, ex station; Continental commercial quality on offer at about £8 5s. per ton, c.i.f. U.K. ports.

SODIUM NITRATE.—Quoted £13 per ton, ex store; 96/98% refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—Quoted £24 per ton, ex store. Offered from the Continent at about £22 5s. per ton, c.i.f. U.K. ports.

SODIUM PRUSSIATE, YELLOW.—Spot material quoted 4½d. per lb., ex store, offered for early delivery at 4d. per lb., ex wharf.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption, £3 10s. per ton, ex works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—60/62% solid, £13 5s. per ton; broken, £14 5s. per ton; flake, £15 5s. per ton; crystals, 31/34%, £8 12s. 6d. per ton. All delivered buyers' works U.K. minimum 5-ton lots with slight reduction for contracts. 60/62% solid quality offered from the Continent at about £9 15s. per ton, c.i.f. U.K. ports; broken 15s. per ton more; crystals 30/32%, £7 per ton, c.i.f. U.K. ports.

SULPHUR.—Flowers, £11 5s. per ton; roll, £10 per ton; rock, £10 per ton; ground, £9 15s. per ton, ex store, spot delivery. Prices nominal.

ZINC CHLORIDE.—British material, 96/98% quoted £23 15s. per ton, f.o.b. U.K. ports; 98/100% solid on offer from the Continent at about £21 15s. per ton, c.i.f. U.K. ports. Powdered 20s. per ton extra.

ZINC SULPHATE.—Continental manufacture on offer at about £11 per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, April 16, 1926.

The demand for chemicals on the Manchester market has been quiet again this week and, for the most part, little forward buying is being done just now. Inquiry seems to be confined chiefly to comparatively small parcels for early delivery, the cause of which may be attributed to some extent to the general uneasiness as to the possible outcome of the negotiations in the coal industry, although primarily, of course, it is due to the generally unsatisfactory state of the consuming industries. The export demand for chemicals on this market is quiet.

Heavy Chemicals

Bleaching powder is in quiet request just now, and quotations for this are maintained at £8 10s. per ton. Hyposulphite of soda is steady at £14 10s. per ton for photographic material, and £9 5s. to £9 10s. for commercial, but business has been slow during the current week. Only a moderate demand for phosphate of soda is being met with although values keep fairly steady at £12 10s. to £12 15s. per ton. Glauber salts are selling in limited quantities at £3 5s. to £3 7s. 6d. per ton. Saltcake is unchanged at about £3 per ton and business in this is slow. Alkali is in quietly steady request and values are well held at £6 15s. per ton. Bichromate of soda shows little change on the week at 3¼d. per lb., but current demand continues slow. Bicarbonate of soda is rather quiet at £10 10s. per ton. Sulphide of soda moves off very slowly and quotations are weak, 60–65 per cent. concentrated solid being on offer at £10 15s. to £11 per ton and commercial crystals at £9 12s. 6d. Acetate of soda meets with a limited demand and prices are slightly easier again at £20 to £20 10s. per ton. Caustic soda is still selling in fair quantities both for domestic use and for shipment; values are unchanged at from £15 2s. 6d. per ton for 60 per cent. quality to £17 10s. for 76 per cent. Inquiry for chlorate of soda is only moderate, but at 3⅛d. to 3¼d. per lb. prices show little alteration.

Caustic potash is not meeting with a very active demand at the present time, and quotations are perhaps a little easier at round £27 per ton for 90 per cent. strength. Carbonate of potash, also, is on the quiet side, but there is little alteration in price levels, these ranging from £26 5s. to £26 10s. per ton for 96 per cent. material. Permanganate of potash is rather slow and easy at round 7d. per lb. for the B.P. quality and 5d. for the commercial. Yellow prussiate of potash is in limited request at the moment and quotations are rather weak if anything at about 7d. per lb. Chlorate of potash continues to be offered at 4d. per lb. and fair inquiries for this have been reported. Bichromate of potash is fairly steady at round 4½d. per lb. but the demand is on the slow side.

Arsenic is still quoted at about £14 per ton on rails for white powdered, Cornish makes, but there has been very little business done in this material on the Manchester market during the past week. Sulphate of copper is easier than it has been at £24 per ton, or something under this figure, and the demand is quiet. Nitrate of lead keeps steady at £40 to £41 per ton, but inquiry is slow. Acetate of lead keeps very firm at round £45 for white and £39 to £40 per ton for brown. Acetate of lime is in quiet demand at round £16 10s. per ton for grey and about £8 for brown. Commercial Epsom salts are in fair request at about £3 12s. 6d. per ton, while magnesium sulphate, pharmaceutical quality, keeps steady at £4 10s.

Acids and Tar Products

Acetic acid is rather slow and values are easy at £36 10s. per ton for 80 per cent. commercial quality and about £67 per ton for glacial. Oxalic acid is not too active but is rather steadier at 3⅝d. per lb. Tartaric acid is only in moderate request at 11¼d. per lb., while citric acid is in much the same position at 1s. 3d. to 1s. 3¼d.

The shipping season for pitch is now drawing rapidly to a close and business is quieter with quotations nominal at about 75s. per ton, f.a.s., Manchester. Carbolic acid is dull and weak at 4¾d. per lb. for crystal and 1s. 4½d. per gallon for crude. Solvent naphtha keeps rather quiet at round 1s. 6d. per gallon. Creosote oil meets with a moderate demand at 6½d. per gallon. Cresylic acid is quiet but steady at 1s. 10d. per gallon.

Institution of Fuel Technology

Following upon the largely attended inaugural meeting held on March 5, at the Institution of Civil Engineers, London, the organising committee appointed held their first meeting recently, and it was then definitely decided to adopt the name "Institution of Fuel Technology," which covers the wide field of activities the new Institution will represent. Within the limits of their powers of co-option of additional members, the organising committee are extending invitations to other organisations to be represented. Lord Montagu of Beaulieu has already intimated his intention to join the committee.

A sub-committee was appointed to draft a constitution and by-laws. It will meet at least once a week until the work is completed. The draft constitution will then be considered in detail by the organising committee and eventually a copy will be sent in advance to everyone interested, for consideration, prior to a second public meeting which will be called to adopt or amend as the members may think fit.

It is the intention that the new Institution shall be thoroughly representative of every branch of the wide subject of fuel, and the purely scientific side is already strongly represented, both on the organising committee and in the long list of those who have signified their intention of becoming members as soon as the Institution is constituted. The support so far received has exceeded expectations, and is evidence of the urgent need for one strong and influential organisation to deal with the subject of fuel. Many influential fuel technologists in America and on the Continent have already expressed a desire to join as foreign members.

All communications should be addressed to the hon. secretary (*pro tem.*), Mr. Edgar C. Evans, Caxton House, (East) Tothill Street, Westminster, S.W.1.

Everything possible is being done to expedite the matter, so that if possible an important Fuel Congress may be held in London in the autumn.

Sir A. Mond on the Coal Problem

The annual dinner of the Institution of Structural Engineers was held on Monday in London, W., the president, Sir Charles T. Ruthen, in the chair.

Responding to the toast of "Our Country and Empire," Sir Alfred Mond said that the country required more than any people the combination of the engineer and the chemist for the solution of its difficulties. Politicians could not create success unless the engineer and the business man built up the prosperity of the country. Governments could hinder or they could help, but could not create. The country therefore could only build up its prosperity on new inventions and research. The solution of the coal problem was not legislation but invention. The chemist and the engineer would together solve the problem of coal distillation and would be the real saviours of the mining industry. The Empire and the country were one, he added. He wanted the British people to turn their eyes from the centre of Europe to the British Dominions with a view to developing Imperially. He felt certain that the salvation and future of the British race and the justice of the world lay in keeping together and developing the institutions which the pioneers of old went out to develop and to give their lives.

Huxley Memorial Lectureship

A Thomas Henry Huxley Memorial Lectureship has been founded by the governing body of the Imperial College of Science, London, and the lecture will be delivered annually at the College for the next five years on May 4, the anniversary of Huxley's birth, on some subject connected with Huxley's activities. The joint committee which has been appointed to decide on the scope of the lectures and to select the lecturer each year has nominated for 1926 Dr. Chalmers Mitchell, secretary of the Zoological Society, who has chosen as his subject "Logic and Law in Biology." The Huxley Memorial Medal of the Royal Anthropological Institute has been awarded by the Council to Dr. Alés Hrdlicka, of the Smithsonian Institution, Washington, D.C., who, in accordance with the terms of the award, will deliver the Huxley Memorial Lecture in 1927.

Company News

SADLER AND CO.—An interim dividend of 3 per cent. is announced.

BROKEN HILL PROPRIETARY CO.—A half-yearly dividend of 1s. per share has been declared, payable on May 12.

BURMAH OIL CO.—Half-yearly dividends on the 6 per cent. preference, 6 per cent. second preference, and 8 per cent. preference shares will be paid on April 30.

CANADIAN EXPLOSIVES CO.—A dividend of $1\frac{3}{4}$ per cent. has been declared for the quarter ended March 31, 1926, on the 7 per cent. cumulative preferred shares, payable on April 15.

HADFIELDS, LTD.—The directors have decided to recommend that a dividend be paid for the year ended December 31 last, on the ordinary shares at the rate of 3 per cent., less income tax.

BROKEN HILL SOUTH, LTD.—A dividend of 1s. 6d. per share and a bonus of 2s. have been declared. This is the third distribution on account of the current year, making a total of $52\frac{1}{2}$ per cent.

BABCOCK AND WILCOX, LTD.—The directors announce a final dividend on the ordinary shares of 5 per cent. free of tax, and a bonus of 3 per cent., making the total distribution for the year 13 per cent.

MAZAPIL COPPER CO.—The profit for the year ending December 31, 1925, amounts to £32,004 and £33,761 was brought forward, making a total of £65,765, which the directors recommend should be carried forward.

SVENSKA TANDSTICKS AKTIEBOLAGET (THE SWEDISH MATCH CO.).—A final dividend at the rate of 8 per cent. in respect of the year ended December 31 last, making 12 per cent. for the year on the "A" and "B" shares, has been proposed, payable on April 30.

NEW TAMARUGAL NITRATE CO., LTD.—Resolutions increasing the capital of the company and altering the articles of association so as to permit of the proposed 100 per cent. scrip bonus, will be submitted at an extraordinary general meeting to be held in Valparaiso on May 14.

MASON AND BARRY, LTD.—The report for 1925 shows that the profit realised on the year's working, after payment of all expenses, amounts to £7,514, to which has to be added £28,043 brought forward, making £35,557. A dividend of 10 per cent. is proposed, leaving to be carried forward £17,040.

TEHIDY MINERALS, LTD.—For the year ended December 31 last the profit was £10,745, and the balance brought forward of £1,809 makes a total of £12,554. The corporation profits tax absorbed £110 and the balance of the preliminary expenses is to be written off, amounting to £1,586, leaving a credit balance of £10,858, which is to be carried forward. Since the close of the accounts the loan account of £5,000 has been paid off.

TARMAC, LTD.—After providing general establishment charges, etc., the profit for the year ended December 31 last, including £12,952 interest and dividends received from subsidiary undertakings, amounted to £83,189, to which should be added the balance brought forward of £18,674, making a total of £101,863. A final dividend on the ordinary shares of 1s. 6d. per share, free of tax, is proposed, making 10 per cent. for the year, and £5,225 is transferred to general reserve, leaving a balance to be carried forward of £16,882.

WEBB'S CRYSTAL GLASS CO.—The report for the year ended December 31 last states that the net profit has risen from £945 to £14,716. After carrying £3,000 to general reserve, the directors recommend a dividend at the rate of 8 per cent. per annum, less tax, on the ordinary shares, with participation in the remaining profits equivalent to a further 1 per cent., less tax, also a dividend of 3·262 per cent., less tax, on the deferred shares, representing participating rights of those shares in profits which it has been decided to distribute, leaving a balance of £2,580 to be carried forward.

BRITISH COTTON SEED PRODUCTS, LTD.—In accordance with a request from the shareholders' committee, an extraordinary general meeting has been convened by the company for 12 noon on April 20, at Winchester House, Old Broad Street, London, when resolutions concerning the appointment of new directors will be put to the vote. Viscount Doneraile, the chairman, in a circular to the shareholders states that the shareholders' committee was appointed during the year 1923 to consider the position of the company. The resolution mentioned above refers to Mr. J. W. Pearson and Mr. J. E. Frost, who are directors of the British Oil and Cake Mills, Ltd., which has recently become associated with Lever Brothers, Ltd., and it is implied that their interest in connection with these companies is detrimental to the interest of the shareholders of the British Cotton Seed Products, Ltd. "My colleagues and I," the chairman adds, "are strongly of the opinion that the presence of the two gentlemen referred to on the board is of the greatest value to the company."

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P Gee, Patent and Trade Mark Agent, Staple House, 51 and 52 Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.

Opposition to the Registration of the following Trade Marks can be lodged up to May 7, 1926.

"RUSLAC."

465,592. For chemical substances used as anti-corrosives, preservatives and waterproof dressings for metals, wood, stone, cement and brickwork. Class 1. Ernest Graham Evans, trading as Anti-Corrosive Products Co., "Sunnydale," Crofton Road, Orpington, Kent; chemist. December 24, 1925. (To be Associated. Sect. 24.)

"RUSDOPE."

465,593. For chemical substances used as anti-corrosives, preservative and waterproof dressings for metals, stone, cement and brickwork. Class 1. Ernest Graham Evans, trading as Anti-Corrosive Products Co., "Sunnydale," Crofton Road, Orpington, Kent; chemist. December 24, 1925. (To be Associated. Sect. 24.)

Tariff Changes

UNION OF SOUTH AFRICA.—Rebates of the whole of the Customs duty will be allowed on the following articles when imported for the industries stated:—Dips, disinfectant and insecticide industries—methyl salicyl, turpentine and red oil. Ink—gallic and tannic acids, and sulphate of iron. Paints, varnishes, etc., acetic acid, amber oil, and amyl acetate. General purposes—paraffin wax in bulk.

BELGIUM.—In spite of reductions, certificates of origin are still required for the following to qualify for "minimum" rates:—Sulphurous acid, carbonic acid, liquefied and compressed; acetylene, compressed; anhydrous ammonia, apparatus for drying, distilling and similar industries.

SIERRA LEONE.—The Government has just gazetted an Order prohibiting "the importation into the colony or protectorate" of the following non-British dyestuffs "if not the produce or manufacture of any part of the British Empire: (1) All derivatives of coal-tar generally known as intermediate products capable of being used or adapted for use as dyestuffs or of being modified or further manufactured into dyestuffs; (2) all direct cotton colours, provided that this prohibition shall not apply to dyestuffs imported in accordance with the terms of any licence issued by the Governor."

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

CHEMICAL FERTILISERS, ETC.—The Egyptian Ministry of Agriculture, Cairo, is inviting tenders for the supply of the following goods: Nitrate of soda, nitrate of lime, sulphate of ammonia, superphosphate of lime, new bags for bagging nitrate of soda, new sacks for packing cotton seed, sealers. Local representation is essential. (Reference No. CX.1041.)

OILS AND FATS.—A British subject resident in London desires to represent British exporters of the above goods in Italy, either as travelling representative or resident agent. (Reference No. 435.)

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

BASFORD FINISHING CO., LTD., Hucknall Road Works, Basford, bleachers. (C.C., 17/4/26.) £16 2s. 8d. March 5.

DRAPER, Mr. E. J., 3, Rochester House, Rushcroft Road, Brixton, scent manufacturer. (C.C., 17/4/26.) £12 5s. February 23.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

BRITISH TAR PRODUCTS, LTD., London, S.W. (M., 17/4/26.) Registered March 23, £46,330 debentures; general charge. *£29,106 5s. December 15, 1925.

CHARLES AND CO., LTD., Leeds, manufacturers of toilet requisites. (M., 17/4/26.) Registered March 26, £2,000 first debenture, to Bank; general charge. *Nil. December 15, 1925.

PARIPAN, LTD., London, W., paint and varnish manufacturers. (M., 17/4/26.) Registered March 23, £3,000 Land Registry charge and further charge (supplemental to mortgage dated January 31, 1925), to Insurance Co.; charged on 4 and 14, Belgrave Square, W. *£56,000. May 20, 1925.

TEGGIN (WALTER), LTD., Salford, dyers and cleaners. (M., 17/4/26.) Registered March 25, £400 debenture, to W. Rigby, 2, Mona Drive, Douglas (I.M.); general charge. *Nil. July 5, 1925.

THOMAS (A.), LTD., London, W., soap manufacturers. (M., 17/4/26.) Registered March 25, £1,000 debenture, to Mrs. A. Thomas, Monkville, Monkville Avenue, Golders Green; general charge.

Satisfaction

DONKIN KENYON AND CO., LTD. (late DONKIN KENYON AND CHATTERTON, LTD. and CHATTERTON AND KENYON, LTD.), Blackburn, bleachers, etc. (M.S., 17/4/26.) Satisfaction registered March 29, all moneys, etc., registered January 21, 1921.

Receivership

C. R. L., LTD. (R., 17/4/26.) W. G. Board, of Anchor Chambers, Wind Street, Swansea, was appointed receiver and manager on March 31, 1926, under powers contained in debenture dated May 11, 1925.

London Gazette, &c.

Companies Winding Up Voluntarily

BECCO ENGINEERING AND CHEMICAL CO., LTD. (C.W.U.V., 17/4/26.) By Special Resolution, March 15, confirmed March 31.

PHILLI-MIRANO, LTD. (C.W.U.V., 17/4/26.) S. Sharpe Chartered Accountant, Balfour House, Finsbury Pavement, E.C.2, appointed liquidator, April 7. Meeting of creditors, Institute of Chartered Accountants, Moorgate Place, E.C., Wednesday, April 28, at 12 noon.

Business Names Registered

[The following (trading name and address, nature of business, date of commencement, and proprietors' names and addresses) have been registered under the Registration of Business Names Act.]

ROSS MANUFACTURING CO. (chemicals), 32, Buxton Road, Huddersfield. Business commenced March 20, 1926. Registered proprietor, Norman K. Taylor.

C. PEARNE HOUGH AND CO. (Chemical Exporters), 32/34, Theobald's Road, W.C.1. Business commenced April 1, 1926. Registered proprietor, Mr. Chas. P. Hough.

SIMMS AND SONS (Wholesale Chemists), Jubilee Works, Staveley, Chesterfield. Registered proprietors, Messrs. Frank Simms, Oswald Hugo Simms and Herbert Simms.

New Companies Registered

BELL AND HOWELL CO., LTD., 320, Regent Street, London, W.1. Registered March 30, 1926. Manufacturers and importers of, dealers in and agents for laboratory apparatus, optical and other lenses, photographic supplies, etc., Nominal capital, £1,000 in £1 shares.

CAREY, McCLELLAN AND CO., LTD., Blackfriars House, Manchester. Registered April 8, 1926. Bleachers, dyers, finishers, dressers and chemical manufacturers, etc. Nominal capital, £100 in £1 shares.

A. G. HATCH AND CO., LTD. Registered April 7, 1926. Manufacturers of and dealers in steel drums, barrels, cask and other containers; general engineers and welders. Nominal capital £10,000 in £1 shares (6,000 7½ per cent. cum. preference, 2,800 ordinary, and 1,200 deferred). A director: A. G. Hatch, 62, Dalkeith Road, Ilford.

Canada's Progressive Mineral Industry

THE last quarter of a century has been a period of phenomenal growth in the mineral industry of Canada and in the entire industrial activity of the country. The twentieth century has been called Canada's century, and rightly so, if the enormous strides taken during the first twenty-five years may be taken as indicative of future progress, according to a report from the Mines Branch of the Dominion Department of Mines at Ottawa.

The following table gives the value of the mineral production for every fifth year since the war. For purposes of comparison and of giving a rough indication of general industrial activity, a column is added showing the external trade of the country—i.e., the total value of imports for home consumption and exports of merchandise:—

Year.	Mineral Production.		Aggregate External Trade.	
	$	£	$	£
1910 ..	106,823,623	21,950,060	669,082,192	137,482,642
1915 ..	137,109,171	28,173,117	917,398,417	188,506,524
1920 ..	227,859,665	46,820,479	2,351,186,832	483,120,582
1924 ..	209,516,465	43,051,328	1,951,920,164	401,079,486

It is interesting to note in connection with both items that the value for 1915 was double that for 1905, and that although the value of the mineral production for 1924 was only 55 per cent. greater than that for 1915 (while the value of the aggregate external trade more than doubled), there is in general a striking similarity in percentage increment. The increase has been due in part to a depretiation in the value of the unit of currency, but in greater part to an increase in quantity, production, and consumption.

Dr. Cottrell on Nitrogen Fixation

DR. FREDERICK G. COTTRELL, chairman of the Fixed Nitrogen Research Laboratory at Washington, in a recent address before the Princeton Chemical Club estimated that approximately 44 per cent. of the world's nitrogen would be obtained this year by atmospheric fixation, as compared with one-fourth of that amount before the war. Furthermore, he declared, "while the 10 per cent. made in this way before the war was almost wholly by the arc and cyanamide process, nearly 70 per cent. of this year's fixation will be through the direct synthesis of ammonia." Dr. Cottrell said that researches by Dr. Hugh Scott Taylor, Professor of Physical Chemistry at Princeton, had furthered the knowledge of direct synthesis.

The importance of the Haber method for preparing nitrogen was explained by Dr. Cottrell.